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A REVISION OF THE *ANASTREPHA DACIFORMIS* SPECIES GROUP (DIPTERA: TEPHRITIDAE)

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Abstract.—The *Anastrepha daciformis* species group is revised. Thirteen species are recognized: ***A. antilliensis*, n. sp.** (Puerto Rico, Dominican Republic); ***A. aquila*, n. sp.** (Costa Rica); ***A. avispa*, n. sp.** (Costa Rica); *A. bicolor* (Stone) (s. Texas to Costa Rica); ***A. castanea*, n. sp.** (Argentina and Brazil (Mato Grosso do Sul)); *A. daciformis* Bezzi (s. Brazil, Paraguay, Argentina); ***A. katiyari*, n. sp.** (Venezuela); *A. macrura* Hendel (w. Venezuela, Ecuador, Paraguay, Brazil (Bahia, Rio Grande do Norte)); ***A. maculata*, n. sp.** (Virgin Is., Mona I.); ***A. murrayi*, n. sp.** (Jamaica); *A. pallens* Coquillett (s. Texas to Honduras and El Salvador); *A. stonei* Steyskal (Florida, Bahamas, Dominican Republic); ***A. zucchii*, n. sp.** (Brazil (Roraima)). A key to the species and an analysis of their phylogenetic relationships is presented and a diagnosis, description and illustrations of each species are provided.

Key Words: *Anastrepha, daciformis,* species group, key, Neotropical, phylogeny

Resumen.—Se revisan las especies de *Anastrepha* del grupo *daciformis* en el cual se reconocen trece especies: ***A. antilliensis*, n. sp.** (Puerto Rico, Dominican Republic); ***A. aquila*, n. sp.** (Costa Rica); ***A. avispa*, n. sp.** (Costa Rica); *A. bicolor* (Stone) (sur de Texas a Costa Rica); ***A. castanea*, n. sp.** (Argentina y Brasil (Mato Grosso do Sul)); *A. daciformis* Bezzi (sur de Brasil, Paraguay, Argentina); ***A. katiyari*, n. sp.** (Venezuela); *A. macrura* Hendel (oeste de Venezuela, Ecuador, Paraguay, Brazil (Bahia, Rio Grande do Norte)); ***A. maculata*, n. sp.** (Virgin Is., Mona I.); ***A. murrayi*, n. sp.** (Jamaica); *A. pallens* Coquillett (sur de Texas a Honduras y El Salvador); *A. stonei* Steyskal (Florida, Bahamas, Republica Dominicana); ***A. zucchii*, n. sp.** (Brasil (Roraima)). Se presenta además una clave para la separación de las especies y un análisis de sus relaciones filogenéticas, y se proporcionan diagnosis, descripciones e ilustraciones de cada una de las especies estudiadas.

The *daciformis* species group includes some of the most distinctive species of *Anastrepha*, the largest New World genus of Tephritidae, with almost 200 species. The *daciformis* group includes 13 species, eight of which are described in this paper. Together these species range from the West Indies and southern Texas to Argentina. All 13 species have dark brown markings of some type, and all but three have uninterrupted marginal wing bands, presumably for mimicry of vespid or other wasps. Four

Table 1. M ratio (distance along M from bm-cu to r-m/distance from r-m to dm-cu) in the *daciformis* species group.

Species	n	Range	Average
antilliensis	5	1.75–2.06	1.91
aquila	7	1.64–1.89	1.75
avispa	10	1.50–1.92	1.68
bicolor	16	1.57–2.33	1.88
castanea	4	1.25–1.49	1.41
daciformis	9	1.52–2.00	1.76
katiyari	5	1.05–1.34	1.18
macrura	11	1.41–2.04	1.72
maculata	6	1.21–1.53	1.37
murrayi	1	1.74	1.74
pallens	15	1.27–1.95	1.58
stonei	8	1.27–1.40	1.32
zucchii	5	1.52–1.79	1.68

species in this group were placed in the subgenus or genus *Pseudodacus* by some authors (e.g., Hendel 1914a,b, Stone 1939, Blanchard 1961, Foote 1967), but Steyskal (1977a) synonymized this name with *Anastrepha* based on discovery of a fifth species intermediate in some characters used to differentiate *Pseudodacus*. Some of the new species described in this paper are also intermediate in additional characters between the previously described species and typical *Anastrepha* species, lending further support to Steyskal's decision.

Materials and Methods

I follow the morphological terminology of McAlpine (1981), except as noted in Norrbom and Kim (1988a). Wing band terminology follows Stone (1942) and Steyskal (1977b). I use the term marginal informally to describe the uninterrupted band on the anterior margin of the wing in most species of the *daciformis* group formed by fusion of the C-band and the apical half of the S-band. The following names are used for the white or yellow stripes of the mesonotum (Fig. 7B): medial—unpaired and expanded posteriorly; dorsocentral—paired, usually only presutural, but also postsutural in *stonei*; sublateral—paired, covers transverse suture and extends posteriorly to intra-alar seta; lateral presutural—paired, usually extends from posteromesal corner of postpronotal lobe, on scutum along border of anterior part of notopleuron, then curves laterally to cover posterior part of notopleuron. I use the term pale to refer to these and other areas of the body that may vary, often intraspecifically, from white to yellow. The M ratio (medial vein ratio) is the distance along M from bm-cu to r-m/ distance from r-m to dm-cu. The values for each species are presented in Table 1.

The length of the female terminalia is a

Table 2. Mesonotum length in mm, syntergosternite 7 length in mm, and their ratio in the *daciformis* species group. Figures include the range, average and standard deviation.

Species	n	Mesonotum	Syntergosternite 7	Syntergosternite 7/Mesonotum
antilliensis	3	1.95–2.27, 2.14 ± 0.17	2.25–2.75, 2.50 ± 0.25	1.10–1.25, 1.17 ± 0.07
aquila	5	3.66–4.08, 3.91 ± 0.18	7.32–7.78, 7.54 ± 0.17	1.83–2.00, 1.93 ± 0.07
avispa	12	3.24–3.70, 3.49 ± 0.15	3.91–4.75, 4.36 ± 0.29	1.17–1.34, 1.25 ± 0.06
bicolor Total	24	2.81–3.79, 3.31 ± 0.31	3.58–6.45, 5.14 ± 1.03	1.17–1.86, 1.55 ± 0.22
bicolor Short	11	2.81–3.58, 3.09 ± 0.28	3.58–4.95, 4.13 ± 0.42	1.18–1.59, 1.34 ± 0.12
bicolor Long	13	3.16–3.79, 3.48 ± 0.22	5.41–6.45, 6.00 ± 0.40	1.57–1.86, 1.72 ± 0.09
castanea	3	2.29–3.16, 2.74 ± 0.44	2.95–3.49, 3.23 ± 0.27	1.11–1.29, 1.20 ± 0.09
daciformis	13	2.58–2.89, 2.76 ± 0.11	2.12–2.70, 2.43 ± 0.19	0.75–0.98, 0.88 ± 0.07
katiyari	11	2.70–3.12, 2.94 ± 0.15	3.95–4.99, 4.32 ± 0.29	1.27–1.64, 1.57 ± 0.11
macrura	9	3.41–3.79, 3.56 ± 0.24	4.99–6.66, 5.76 ± 0.65	1.43–1.89, 1.62 ± 0.15
maculata	4	2.25–2.70, 2.54 ± 0.20	2.58–2.85, 2.74 ± 0.13	1.03–1.15, 1.08 ± 0.05
murrayi	1	2.57	3.91	1.52
pallens	22	2.70–3.45, 3.08 ± 0.17	2.91–3.70, 3.26 ± 0.19	0.95–1.17, 1.06 ± 0.05
stonei	6	2.37–2.66, 2.50 ± 0.11	2.79–3.24, 3.09 ± 0.18	1.16–1.31, 1.23 ± 0.06
zucchii	2	3.16–3.37, 3.27 ± 0.15	4.62–5.28, 4.95 ± 0.47	1.46–1.57, 1.51 ± 0.08

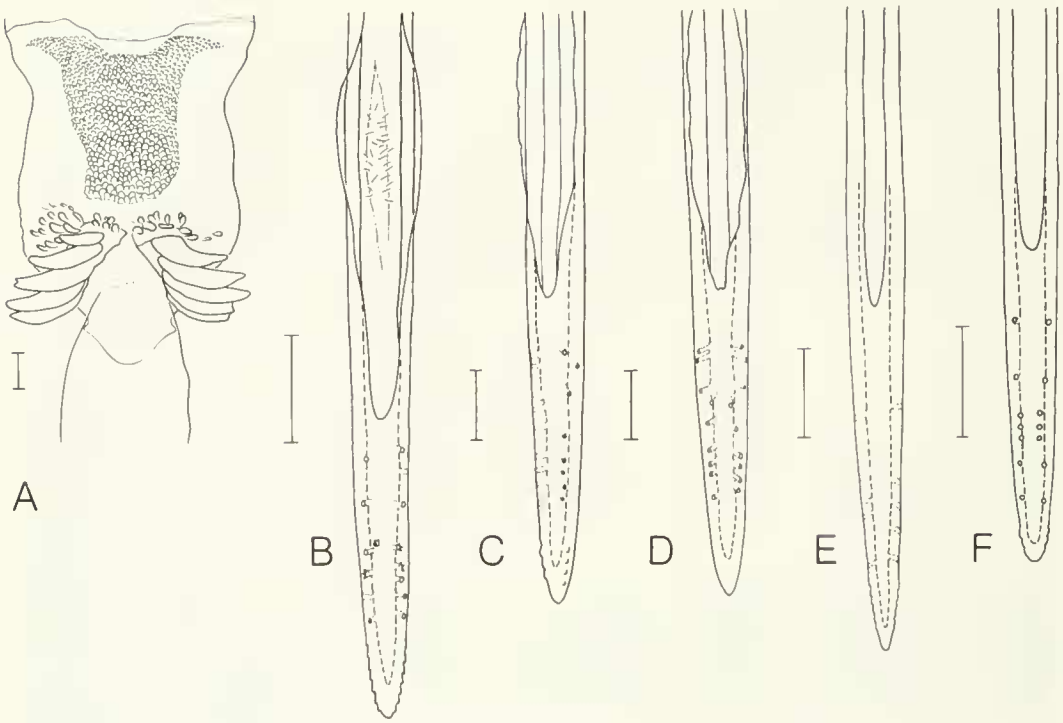

Fig. 1. Female terminalia. A, Scales of eversible membrane, *A. macrura* (San Bernardino, Paraguay). B–F, aculeus tip, ventral view (ventrolateral in C). B, *A. daciformis* (São Paulo, Brazil); C–D, *A. macrura* (Rancho Grande, Venezuela); E, *A. pallens* (Reynosa, Mexico); F, *A. stonei* (Bahamas Is.). Bar = 0.05 mm.

useful taxonomic character in this group. The length of syntergosternite 7 (= oviscape) and its relative length (compared to mesonotum length) are presented in Table 2.

Because the aculeus is so fine in this group, it is difficult to dissect, and it and the eversible membrane are easily damaged. For this reason, I usually dissected only one or several females per species for description of the aculeus, thus the characters may vary more than stated in the descriptions. The aculeus tip is oval or round in cross-section and difficult to orient for examination. Up to a third of the tip may be finely serrate in some species (*daciformis, pallens*), but the serrations are often difficult to see as they sometimes lie off the lateral plane (Fig. 1C–D).

The following acronyms are used for depositories of the specimens studied: AMNH—American Museum of Natural History, New York; CEEA—Comisión Ecuatoriana de Energía Atómica, Quito; CMP—Carnegie Museum of Natural History, Pittsburgh; DEBUG—Department of Environmental Biology, University of Guelph; FSCA—Florida State Collection of Arthropods, Gainesville; IEXV—Instituto de Ecología, Xalapa; INBio—Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica; INPA—Inst. Nacional de Pesquisas da Amazônia, Manaus; INTA—Instituto Nacional de Tecnología Agropecuaria, Castellar, Argentina (via Norma Vaccaro); IZAM—Universidad Central de Venezuela, Maracay; López—Jorge López collection, Guatemala; MCSNM—Museo Civico di Storia Naturale, Milan; MNM—Magyar Természettudományi Múzeum, Budapest; NMW—Naturhistorisches Museum Wien; Riley—Don Riley, APHIS-PPQ, Brownsville, Texas; TAMU—Texas A&M University, College Station; UNAM—Universidad Nacional

Table 3. Characters used in phylogenetic analysis of the *daciformis* group.

1. Predominant body color, except for pale areas and brown spots—0) yellow to orange-brown; 1) red-brown to dark brown.
2. Frons color—0) with lateral brown spot along eye margin on dorsal part; 1) unicolorous, except ocellar tubercle brown; 2) with transverse brown band or spot including ocellar spot; 3) with transverse brown band, at least sometimes with lateral anterior extension, broadest along eye margin. Brown markings may be reduced or absent in teneral specimens. Coded as ordered.
3. Gena color—0) unicolorous; 1) with dark spot below eye (may be faint or absent in teneral specimens).
4. Occiput color—0) entirely yellow; 1) with brown stripes or triangular marks on or near sutures of median occipital sclerite; 2) mostly brown except anterior margin. Coded as ordered.
5. Number of orbital setae—0) 2; 1) 1, posterior orbital seta absent. This occurs as homoplasy in various other species of *Anastrepha*, e.g., see Norrbom (1991).
6. Antenna length—0) not elongate nor extended to level of ventral margin of face, first flagellomere <3 times as long as wide (measured on mesal side); 1) elongate, extended to or beyond level of ventral margin of face, first flagellomere usually >3 times as long as wide.
7. Mesonotum with dark brown markings—0) scutum and scutellum yellow to dark brown except for pale stripes and apex of scutellum (nonpale areas unicolorous); 1) scutum with triangular brown to dark brown markings, sometimes connected, near posterior margin and scutellum with lateral brown spots or transverse brown band at border of orange and white areas; 2) scutellum with black spots at border of orange and white areas, and scutum usually with dark brown spot mesal to postalar seta, sometimes with additional spots; 3) entire base of scutellum and large part of scutum black. Coded as unordered.
8. Mesonotal pale lateral presutural stripe, middle part (on scutum)—0) complete; 1) narrowly interrupted; 2) absent. May be poorly differentiated in predominantly yellow to orange species. Coded as ordered.
9. Mesonotal pale lateral presutural stripe, posterior part (on posterior part of notopleuron)—0) absent; 1) present. May be poorly differentiated in predominantly yellow to orange species.
10. Mesonotal pale presutural dorsocentral stripe—0) absent; 1) present and connected anteriorly with pale area on postpronotal lobe; 2) separated anteriorly from pale area on postpronotal lobe. This character was difficult to observe for *sagittata* and *antilliensis*, as the surrounding area is pale yellow in these species, but the stripe appears to be absent. Coded as unordered.
11. Scutal microtrichia pattern—0) entirely microtrichose, or at most with medial presutural bare area; 1) nonmicrotrichose medially, lateral and posterior margins microtrichose; 2) entirely or almost entirely nonmicrotrichose. Coded as unordered.
12. Scutellar microtrichia pattern—0) disc entirely microtrichose; 1) disc mostly or entirely without microtrichia.
13. Scutellum color—0) unicolorous or with dark markings only on extreme base; 1) bicolored, with at least basal third on sides and dorsum distinctly darker than apex.
14. Propleuron color—0) yellow; 1) at least partly dark orange or brown.
15. Mesopleuron with dark brown spots—0) without dark brown spots; 1) with small dark brown spot on anepimeron; 2) with small dark brown spots on anepisternum, katepisternum and anepimeron. Coded as ordered.
16. Cell r_1 with hyaline spot—0) with hyaline spot or band at apex of R_1 (usually small in *pallens*); 1) without hyaline spot at apex of R_1, costal and S-bands completely fused in this area.
17. Costal band in cell br—0) broadly extended to vein M along cell bm; 1) not extended to vein M.
18. Costal band in cell r_{2+3}—0) covering base of cell; 1) not covering base of cell.
19. S-band, basal section—0) without posterior extension toward wing margin in cell a_1; 1) with posterior extension to or towards wing margin in cell a_1. The extension is not as broad or long in some specimens of *stonei* and is not fully extended to the margin in *maculata*, but I tentatively coded these species state 1.
20. S-band, basal section—0) extended along vein Cu_1 beyond bm-cu, but no more than halfway to dm-cu, and cell bcu evenly infuscated; 1) not extended along vein Cu_1 beyond bm-cu, and posterior third or more of cell bcu hyaline or very faintly infuscated; 2) extended along vein Cu_1 to dm-cu, and cell bcu evenly infuscated. In teneral specimens of *pallens* and *stonei*, the band sometimes does not appear to extend along Cu_1 beyond bm-cu, but specimens with the wing pattern fully developed are clearly state 0, and I therefore coded these species 0. Coded as unordered.
21. S-band, middle section—0) continuous; 1) separated from basal and apical sections; 2) absent. In *bicolor* the basal section is sometimes faintly extended into cell dm, but never connects with the apical section; I coded it state 0. Coded as ordered.
22. S-band, apical section width—0) narrow or slightly broadened, apical half of cell r_{2+3} with large hyaline area; 1) very broad, all of cell r_{2+3} infuscated.

Table 3. Continued.

23. V-band, proximal arm—0) complete, extended to vein R_{4+5}; 1) reduced, extended to or slightly anterior to vein M; 2) reduced and paler than costal band or absent. Coded as ordered.
24. V-band, distal arm—0) present; 1) absent.
25. Medial vein ratio (distance along M from bm-cu to r-m/distance from r-m to dm-cu)—0) average greater than 1.5; 1) average less than 1.5. See Table for comparison of values.
26. Abdominal pattern—0) banded (often poorly differentiated in species with predominantly yellow to orange-brown abdomens); 1) intermediate between banded and with T-shaped mark; 2) brown with T-shaped mark. Coded as ordered.
27. Outer surstylus shape—0) long, somewhat truncate; 1) very short and rounded, extended only slightly beyond prensisetae.
28. Aedeagus—0) longer than female syntergosternite 7, distiphallus present; 1) short, less than 1.3 mm long, distiphallus absent; 2) extremely short, less than 0.30 mm long, distiphallus absent. Coded as ordered.
29. Eversible membrane, pattern of dorsobasal scales—0) at least 2 rows of similarly well sclerotized scales; 1) all scales weakly sclerotized; 2) weakly sclerotized except medially interrupted row of large, strongly sclerotized, scales. Coded as unordered.
30. Spermathecae—0) moderately sclerotized; 1) weakly sclerotized; 2) membranous. Coded as ordered.

Autonoma de Mexico, Mexico, D.F.; USNM—National Museum of Natural History, Washington, D.C.; USP—Museu de Zoologia, Universidade de São Paulo; ZMHU—Museum für Naturkunde der Humboldt Universität zu Berlin. Barcode numbers, consisting of an acronym + a number, are listed in the specimens examined or type data sections in place of or following the depository acronym if the code is not from the same institution.

Biology and Immature Stages

Host plants are unknown for most of the species of the *daciformis* group. Hosts have been reported for only four species. *Anastrepha daciformis* was reported to attack species of *Prunus* (Rosaceae), *Citrus* (Rutaceae), *Eugenia* and *Psidium* (Myrtaceae) (Rosillo 1953, Hayward 1960, Blanchard 1961), but all of these records are doubtful. The hosts of the other three species all belong to the Sa-

Table 4. Character state distributions in species of the *daciformis* group.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
obliqua	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sagittata	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
antillien-sis	0	1	0	0	0	0	3	0	0	0	2	1	1	0	1	0	0	0	1	0	0	0	0	1	0	0	1	2	2	2
murrayi	0	1	0	0	1	0	3	0	0	1	2	1	1	0	0	0	0	0	1	0	0	0	0	1	0	0	?	?	2	?
stonei	0	0	1	0	1	0	2	0	1	1	2	1	1	0	2	1	0	1	1	0	0–1	0	0	0	1	0	1	2	2	2
maculata	0	1	0	0	1	0	2	0	1	1	0	1	1	0	2	1	0	0	1	0	1	0	0	0	1	0	1	2	2	2
pallens	0	2	1	0	1	0	1	0	1	1	2	0	1	0	0	0	0	1	0	0	1	0	0	1	0	0	1	2	2	2
aquila	1	2	1	1	1	1	0	0–1	1	1	0	0	1	0	0	1	0	0	0	2	2	1	2	1	0	1	1	2	2	2
avispa	1	2	1	0–1	1	1	0	0	1	1	1	0	1	0	0	1	0	0	0	2	2	1	2	1	0	1	1	2	2	2
bicolor	1	2	1	0	1	1	0	0	1	1	1	0	1	0	0	1	1	0	0	0	2	1	2	1	0	0	1	2	2	2
macrura	1	2	1	1	1	1	0	2	1	1–2	0	0	1	1	0	1	1	0	0	0	2	1	2	1	0	2	1	2	2	2
zucchii	1	2	1	2	1	1	0	1	0	0	1	0	1	1	0	1	0	0	0	2	2	1	2	1	0	2	1	2	2	2
castanea	1	3	1	2	1	1	0	2	1	2	0	0	1	1	0	1	1	1	0	1	2	0	1	1	1	0	1	2	2	?
daciformis	1	3	1	2	1	1	0	0	1	2	0	0	1	1	0	1	1	1	0	1	2	0	1	1	0	0	1	2	2	2
katiyari	1	3	1	1	0–1	1	0	0	1	1	1	0	1	0	0	1	1	1	0	1	2	0	1	1	1	0	1	2	2	2

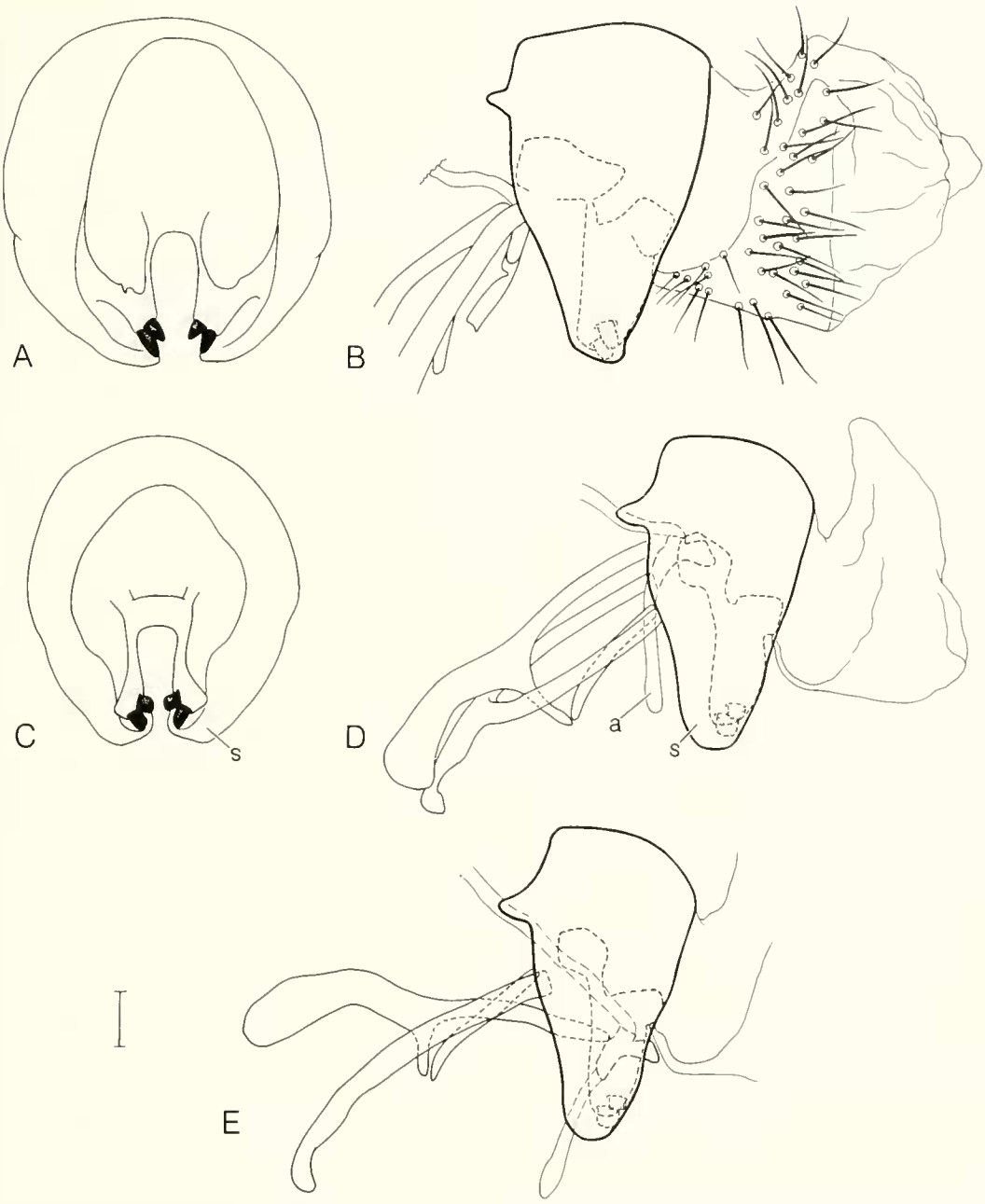

Fig. 2. Male terminalia. A, C, Epandrium and surstyli, posterior view (setae omitted). B, D–E, Epandrium, surstyli and cerci, lateral view (B, D with aedeagus retracted, E with aedeagus extended). A–B, *A. daciformis* (São Paulo, Brazil). C–E, *A. maculata* (Mona I.). a = aedeagus; s = outer surstylus. Bar = 0.05 mm.

potaceae: *A. katiyari* was reared from fruits of caimito (*Sideroxylon obtusifolium* (Roem. & Schult.)); *A. macrura* has been reared from *Chrysophyllum cainito* L. (Caraballo 1981) and *Pouteria lactescens* (Lima 1938, Bondar 1950); and *A. pallens* has been reared from fruits of two species of *Sideroxylon* (Greene 1934, McPhail and Berry 1936, Wasbauer

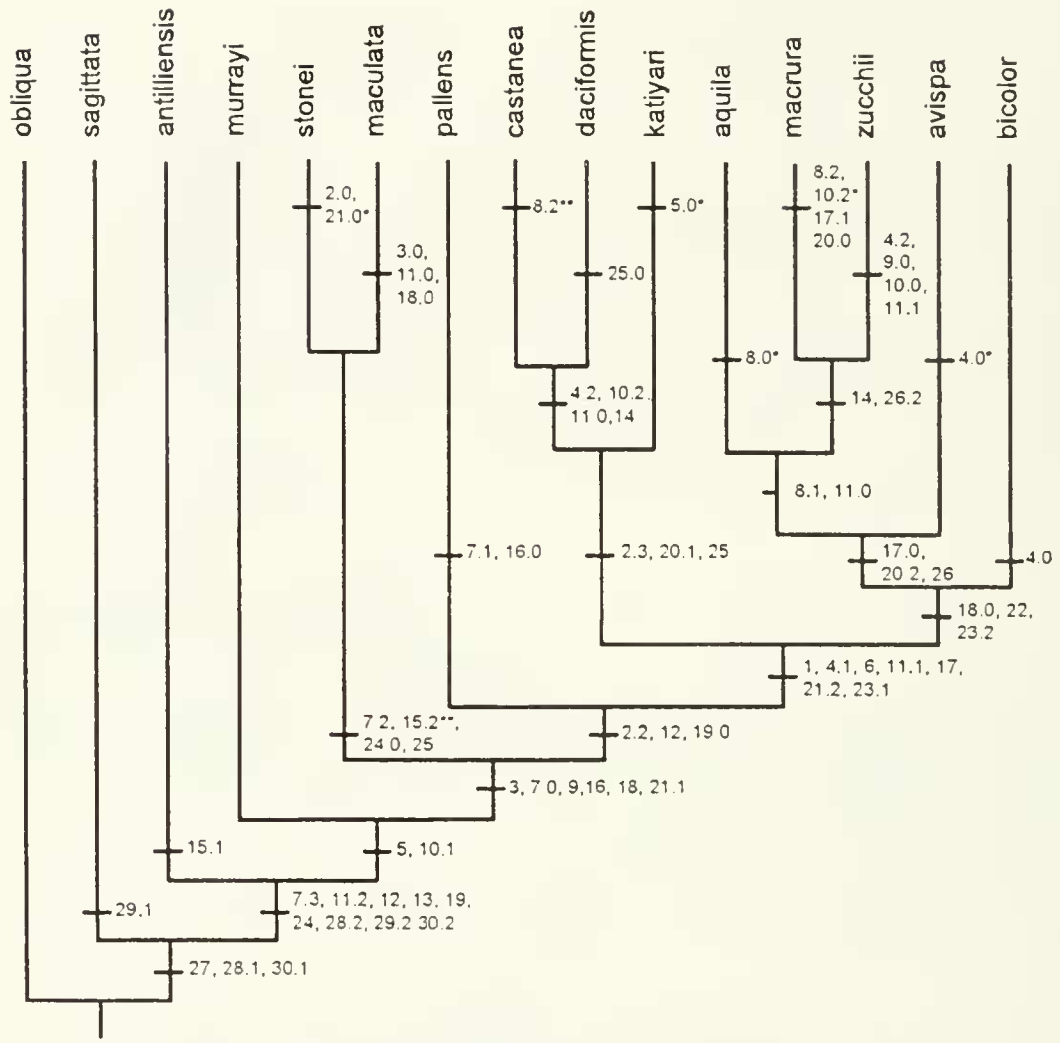

Fig. 3. Hypothesized phylogenetic relationships among species of the *daciformis* group. Character numbers refer to Table 3. * = polymorphic character within a species; ** = character state change of two steps.

1972). The larvae of *A. pallens* feed inside the single large seed within the fruit of *S. celastrinum* (McPhail and Berry 1936, Baker et al. 1944). For the *dentata* group, the sister group of the *daciformis* group, host data are known for only *A. obscura* Aldrich and *A. sagittata* (Stone), but both breed in species of Sapotaceae and at least the latter feeds only inside the seeds (Baker et al. 1944), suggesting that both species groups may specialize on this host family and on the seeds.

The immature stages of species of the *daciformis* group are poorly known. The egg and larvae have been described only for *A. pallens* (Phillips 1946, Norrbom 1985, Steck et al. 1990).

Relationships

Autapomorphies indicating the monophyly of the *daciformis* species group include: 1) scutellum bicolored, with at least basal third on sides and dorsum distinctly darker than apex (Fig. 7–8) (scutellar markings are present on a few other *Anastrepha* species, but in different patterns, and I do not believe they are homologous); 2) eversible membrane

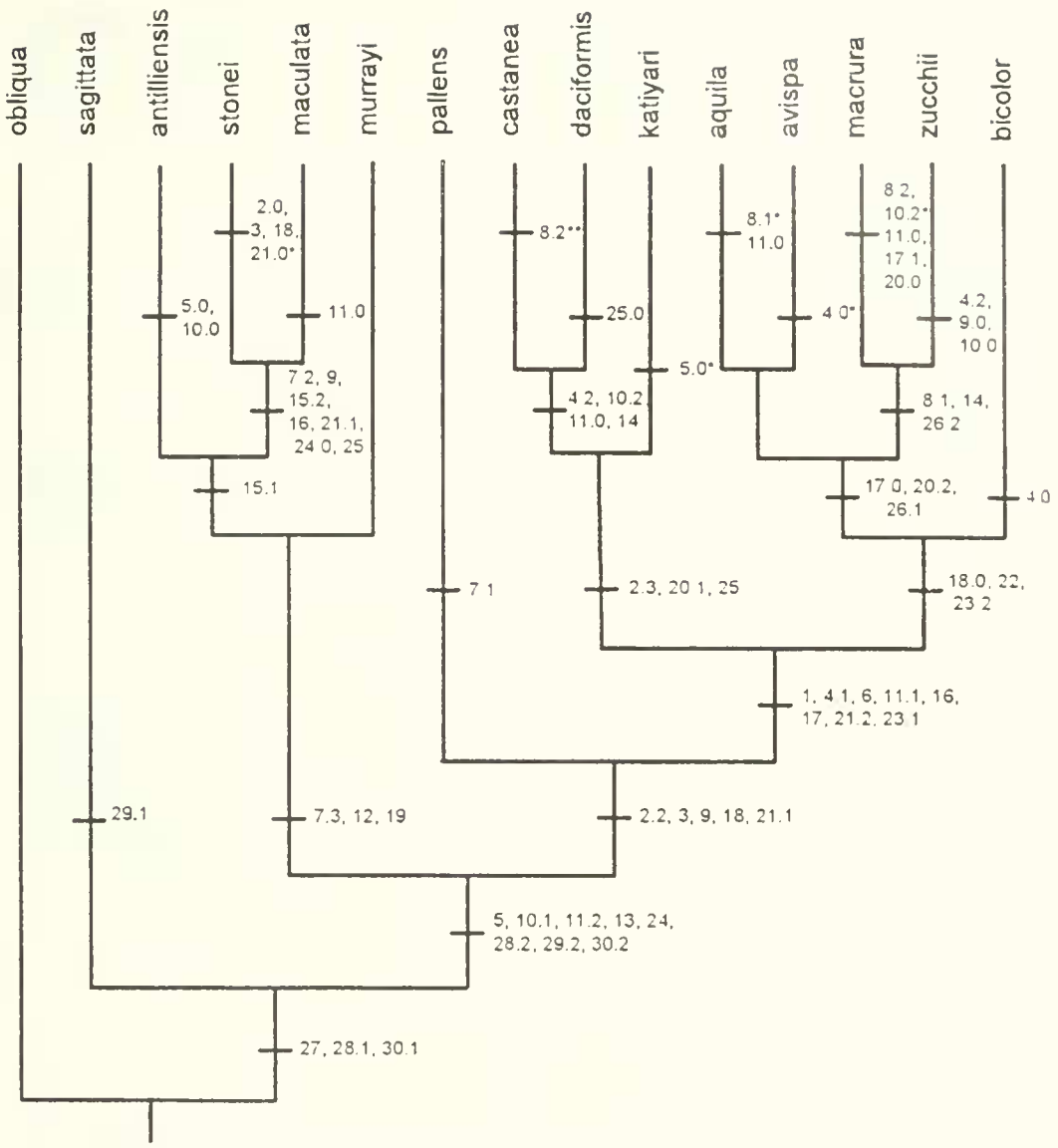

Fig. 4. Hypothesized phylogenetic relationships among species of the *daciformis* group. Character numbers refer to Table 3. * = polymorphic character within a species; ** = character state change of two steps.

with unique pattern of dorsobasal scales (Fig. 1A) (weakly sclerotized except medially interrupted row of large, strongly sclerotized, hooklike scales); 3) spermathecae membranous; 4) aedeagus extremely short, less than 0.30 mm long (Fig. 2B, D–E).

The *daciformis* group appears to be the sister group of the *dentata* group (Norrbom 1985). These two species groups share the following synapomorphies: 1) Outer surstylus very short and rounded, barely extended beyond prensisetae (Fig. 2), and interparameral sclerite relatively posterior in position, in lateral view its apex usually at posterior margin of epandrium (Fig. 2B, D–E); 2) aedeagus short, less than 1.2 mm long, and distiphallus absent; 3) aculeus extremely slender (Fig. 1B–F), less than 0.05 mm wide except at base (reduction in aculeus width has occurred in other *Anastrepha* species, but whether this

is convergence or a synapomorphy for some of these species and the *daciformis* + *dentata* groups remains uncertain).

Another character of possible phylogenetic significance for the *daciformis* and *dentata* groups involves the third instar larvae, but this stage has been described for only one species in each group. In both *A. pallens* and *A. sagittata* (Stone), the hairs of the hind spiracle are shorter (Baker et al. 1944, Phillips 1946) than in other *Anastrepha* species that have been described, except for *A. interrupta* Stone (Norrbom 1985, Steck and Wharton 1988). The larvae of additional species must be studied to determine if this character state is a synapomorphy for the *daciformis* + *dentata* groups.

Relationships within the *daciformis* group were analyzed using PAUP version 3.1.1. The characters used are listed in Table 3, and the character state distributions are shown in Table 4. The outgroup used for determining character polarities included *Anastrepha sagittata* (Stone), which belongs to the *dentata* species group (the hypothesized sister group of the *daciformis* group), and *A. obliqua* (Macquart), a more distantly related member of the genus. The heuristic search option was used, with stepwise and random addition yielding the same set of six trees of 76 steps (consistency index excluding uninformative characters = 0.651, retention index = 0.783). Two of these trees are shown in Figs. 3–4. They show the accelerated transformation character optimization, but the delayed transformation optimization did not produce trees differing in topology (i.e., the relationships of the species). The following clades were always consistent: *maculata* + *stonei*; the *daciformis* complex (with *katiyari* as the sister taxon of *castanea* + *daciformis*); and the *macrura* complex (*aquila, avispa, bicolor, macrura,* and *zucchii,* with the latter two always clustered and *bicolor* the basal taxon). The major differences among the six trees involved the placement of *antilliensis, murrayi,* and *maculata* + *stonei,* which either arise as the basal clades in that order (Fig. 3), or together form a monophyletic group that is the sister group of the rest of the *daciformis* group (Fig. 4). The other variation occurred within the *macrura* complex; *avispa* is either the sister taxon of *aquila,* in a trichotomy with *aquila* and *macrura* + *zucchii,* or is the sister taxon of all three of those species.

Diagnosis of the *Daciformis* Species Group

Posterior orbital seta usually absent (except in *antilliensis* and rarely in other species). Body predominantly brown (Figs. 7B–H) or mostly yellow to orange with some brown markings on mesonotum and/or mesopleuron (Figs. 7A,I, 8A–E). Scutellum mostly dark brown or bicolored, with at least basal third on sides and dorsum orange to brown, distinctly darker than apex; basal seta within darker basal area (except in *avispa*). Katepisternal seta weak or absent. C- and S-bands often fused along costa, and cell r_1 often without hyaline marginal spot at apex of vein R_1. S-band often interrupted or with middle part absent. Eversible membrane, on expanded basal part, with most dorsal scales weakly sclerotized, but with one, medially interrupted row of large, strongly sclerotized, hooklike scales (Fig. 1A). Aculeus slender, less than 0.05 mm wide, except at base; tip needlelike, nearly circular in cross-section, with or without serrations apically (Fig. 1B–F). Outer surstylus very short, barely extended beyond prensisetae (Fig. 2). Aedeagus extremely short, less than 0.30 mm long; distiphallus absent (Fig. 2B, D–E).

Key to Species of the *Daciformis* Group

1. V-band complete, distal arm present (Figs. 6B, E–F). Body predominantly yellow to orange, with usually small, discrete dark brown areas, including: 2 dorsal and sometimes 1 posteroventral spot on anepisternum; anterodorsal and posteromedial spots on katepisternum; large medial spot on anepimeron; large area on laterotergite; 2–3 spots at margin of orange basal and white apical areas of scutellum; and often various spots or stripes on scutum (Figs. 7I, 6D–E). S. Florida and Bahamas to Dominican Republic 2

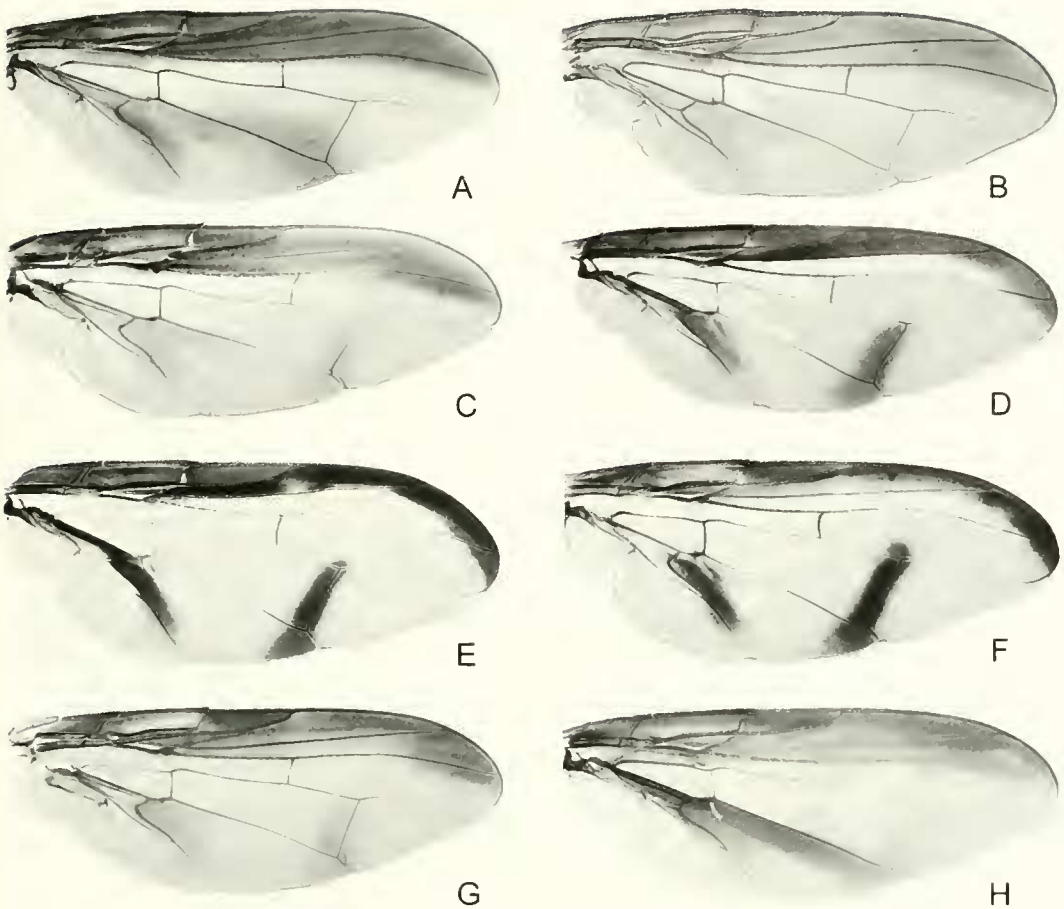

Fig. 5. Wings. A, *A. aquila* (20 km. S. Upala, Costa Rica). B, *A. avispa* (20 km. S. Upala, Costa Rica). C, *A. bicolor* (Cañon de Lobos, Mexico). D, *A. castanea* (Bella Vista, Argentina). E, *A. daciformis* (São Paulo, Brazil). F, *A. katiyari* (Mara, Venezuela). G, *A. macrura* (Bahia, Brazil). H, *A. zucchii* (Ilha de Maracá, Brazil).

– V-band incomplete or absent, distal arm absent (Figs. 5A–H, 6A, C–D). Body either predominantly yellow to orange, sometimes with large mesonotal brown areas (Figs. 7A, 8A–C), or predominantly red-brown to dark brown (Figs. 7B–H, 8F); without numerous small dark brown spots on mesopleuron and mesonotum. Widespread 3

2. C-band covering cell r_{2+3} to beyond level of r-m (Fig. 6B). Spot in cell dm (middle part of S-band) not extended anteriorly beyond vein M. Frons, except for small brown spot on ocellar tubercle, and gena entirely yellow. Scutellum with 3 dark brown spots (1 medial) between yellow basal and white apical areas (Fig. 7I). Virgin Is., Mona I. . . . *maculata*, n. sp.

– C-band not covering most of cell r_{2+3} basal to level of r-m (Figs. 6E–F). S-band complete (Dominican Republic ♀) or spot in cell dm extended anteriorly to vein R_{4+5} along r-m. Frons dorsally with narrow lateral brown spot along eye margin in addition to small brown spot on ocellar tubercle; gena with brown spot below eye. Scutellum with pair of dark brown lateral spots or short bands between yellow basal and white apical areas, sometimes almost connected medially (Fig. 8D–E). S. Florida, Bahamas, Dominican Republic . . . . . *stonei* Steyskal

3. Wing without complete marginal band, interrupted by at least a small marginal hyaline area in cell r_1 at apex of vein R_1 (Figs. 6A, C–D). Body predominantly yellow to orange-brown, but mesonotum largely dark brown or with dark brown posterior markings (Figs. 7A, 8A–C). In lateral view, antenna usually not extended to level of ventral margin of

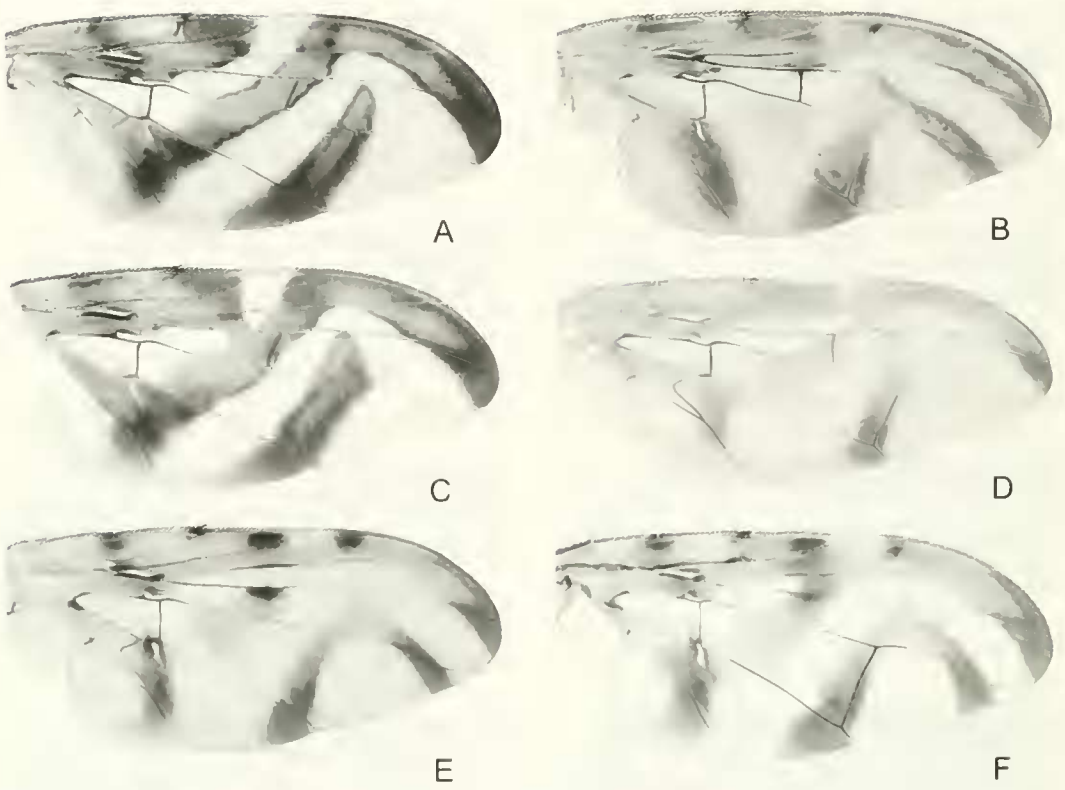

Fig. 6. Wings. A, *A. antilliensis* (37 km N Cabo Rojo, Dominican Republic). B, *A. maculata* (Guana Island, British Virgin Islands). C, *A. murravi* (holotype). D, *A. pallens* (Pharr, Texas, USA). E, *A. stonei* (Nassau, Bahamas). F, *A. stonei* (Santo Domingo, Dominican Republic).

face; first flagellomere usually < 3 times as long as wide 4

– Wing with complete marginal band, cell r_1 without hyaline marginal area at apex of vein R_1 (Figs. 5A–H). Body predominantly red-brown to dark brown and mesonotum similar in color to pleuron (Figs. 7B–H, 8F). Antenna usually extended to level of ventral margin of face; first flagellomere usually > 3 times as long as wide 6

4. S-band interrupted along vein R_{4+5} and in cell dm along vein Cu_1 (Fig. 6D); basal part without extension to posterior wing margin in cell cu_1. Frons with dorsal transverse brown band, and gena with brown spot below eye (both may be faint or absent in teneral specimens). Scutum posteriorly with 2–3 brown spots (Fig. 8C) or usually with trilobed brown band (Fig. 8B). Scutellum with lateral brown spot or complete transverse brown band bordering apical white area. S. Texas to Honduras and El Salvador . . . . . *pallens* Coquillett

– S-band complete (Figs. 6A, C), basal part with extension to posterior wing margin in cell cu_1. Frons, except for small brown spot on ocellar tubercle, and gena entirely yellow. Scutum with broad dark brown area on posterior margin or more extensively dark brown (Figs. 7A, 8A). Scutellum dark brown except apical white area. Greater Antilles 5

5. Scutum, except for pale stripes, mostly orange, only posterior and postsutural lateral margins broadly dark brown; sublateral pale stripe not extended into dark brown area and not reaching intra-alar seta (Fig. 7A). C- and S-bands not connected along vein R_{4+5} (Fig. 6A). Usually 2 orbital setae. Puerto Rico, Dominican Republic . . . . . *antilliensis*, n. sp.

– Scutum, except for pale stripes, mostly dark brown, orange only anteromedially; sublateral pale stripe extended to intra-alar seta (Fig. 8A). C- and S-bands broadly connected along vein R_{4+5} (Fig. 6C). Only 1 orbital seta, posterior seta absent. Jamaica . . . . . *murravi*, n. sp.

6. Marginal wing band broad, all of cell r_{2+3} infuscated (Figs. 5A–C, G–H). Crossvein dm-cu without band (Fig. 5H) or bordered by diffuse band paler than marginal band (Figs.

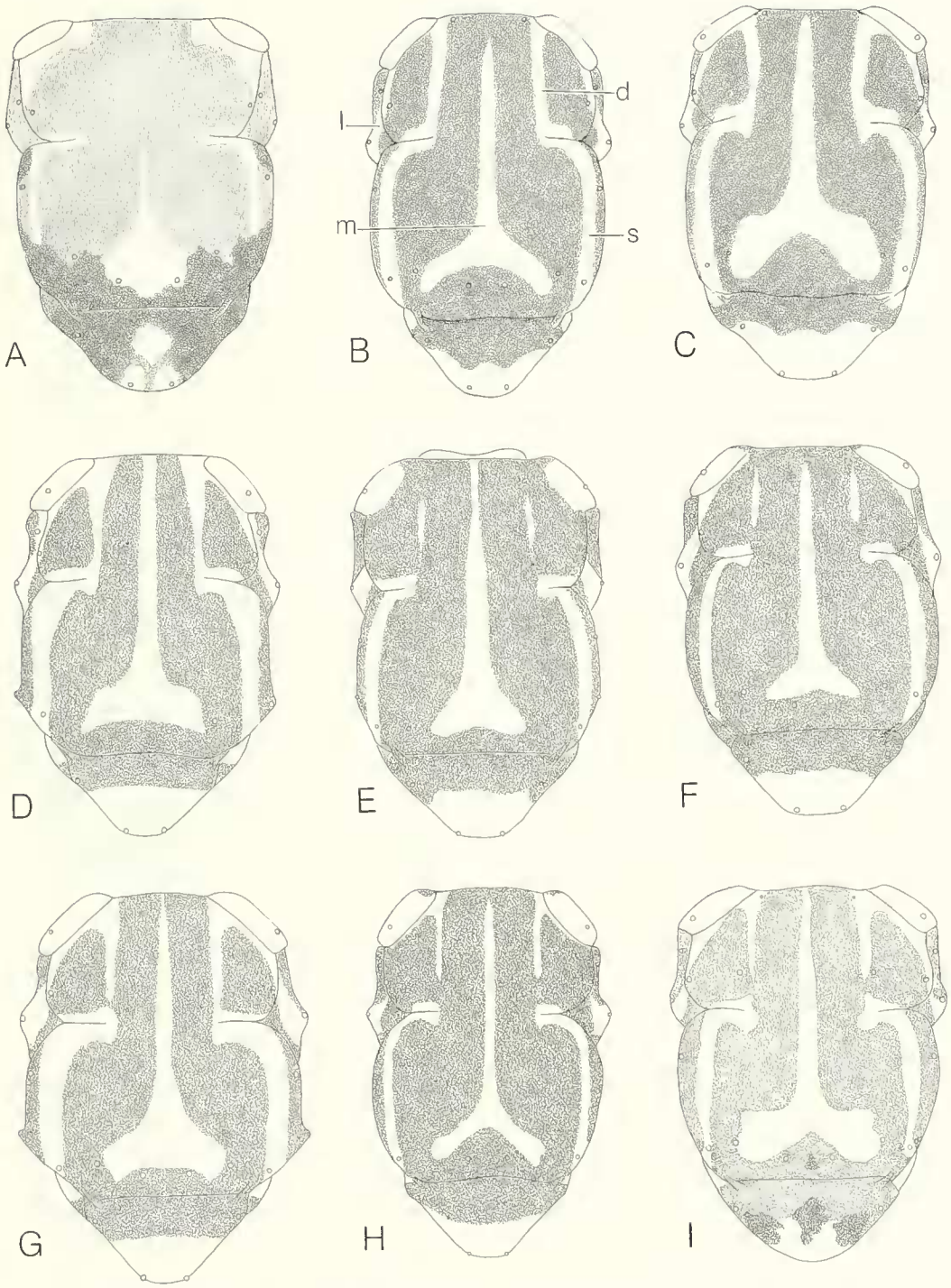

Fig. 7. Mesonotum, dorsal view (setae not shown). A, *A. antilliensis* (Puerta de Tierra, Puerto Rico). B, *A. aquila*, (Las Pailas, Costa Rica). C, *A. avispa* (20 km. S. Upala, Costa Rica. D, *A. bicolor* (Harlingen, Texas). E, *A. castanea* (Bella Vista, Argentina). F, *A. daciformis* (São Paulo, Brazil). G, *A. kativari* (Prigamora, Venezuela). H, *A. macrura* (Bahia, Brazil). I, *A. maculata* (Great Camanoe I., British Virgin Islands). Abbreviations: d = dorsocentral stripe; l = lateral presutural stripe; m = medial stripe; s = sublateral stripe.

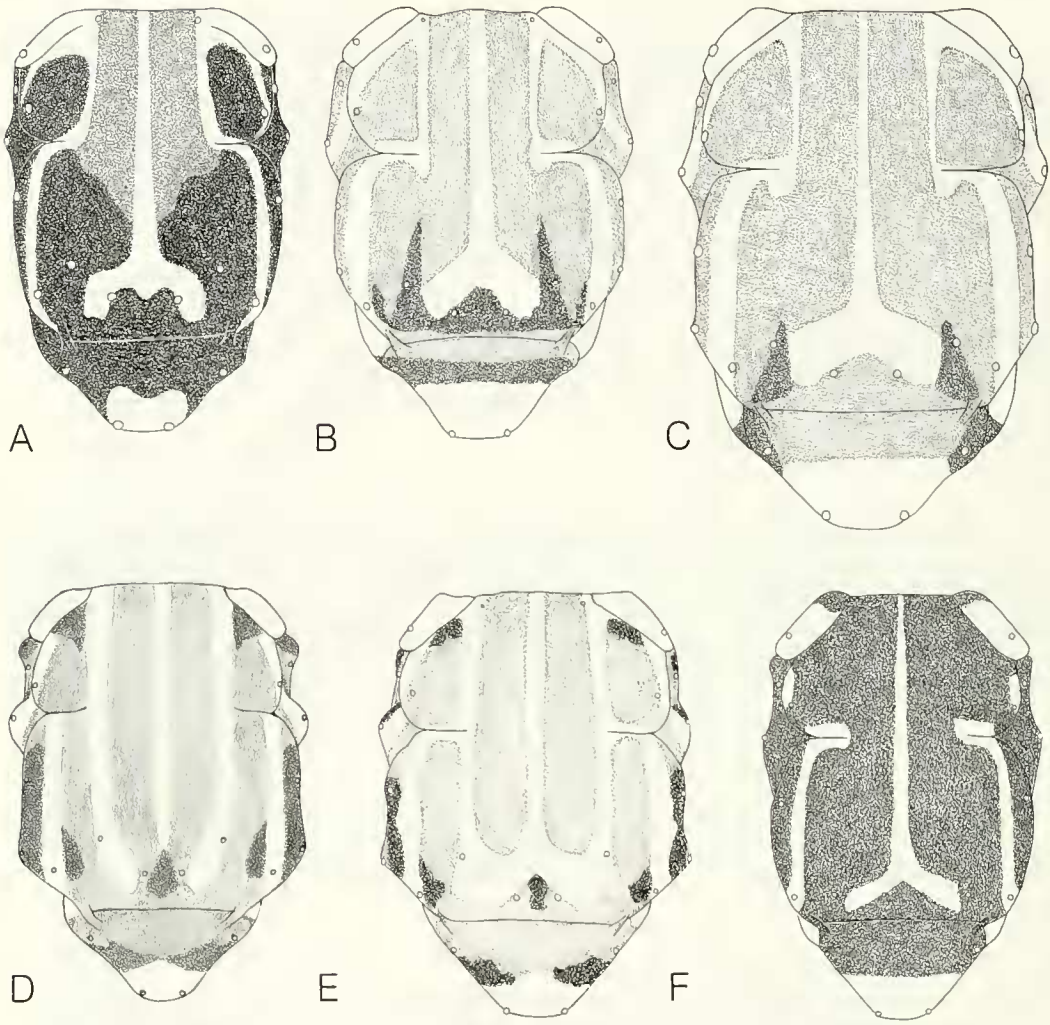

Fig. 8. Mesonotum, dorsal view (setae not shown). A, *A. murrayi* (holotype). B–C, *A. pallens* (Edinburg, Texas). D, *A. stonei* (Manalapan, Florida). E, *A. stonei* (New Providence, Bahamas). F, *A. zucchii* (Ilha de Maraca, Brazil).

5A–C, G). Basal section of S-band extended along vein Cu_1 beyond bm-cu, and cell bcu evenly infuscated. Widespread 7

– Marginal wing band narrow, cell r_{2+3} hyaline except apex (Figs. 5D–F). Crossvein dm-cu with distinct band as dark as marginal band. Basal section of S-band not extended along vein Cu_1 beyond bm-cu, and cell bcu with large posterior hyaline or very pale area. South America 11

7. Abdominal tergites each with narrow median pale spot, forming parallel-sided stripe or T-shaped mark, uninterrupted except usually on middle of syntergite 1+2, which is brown basally (Figs. 9E–F, I). Occiput with large triangular brown areas along lateral sutures of median occipital sclerite or mostly brown. Mesonotum with presutural lateral pale stripe reduced to small spot on scutum (Fig. 8F) or small spot on posterior part of notopleuron (Fig. 7H). South America 8

– Abdominal tergites each with pale posterior band or triangular mark; if forming stripe, sides irregular and not parallel, and usually interrupted at least on tergite 3; base of syntergite 1+2 yellow (Figs. 9B–C). Occiput entirely yellow or with small brown spots or stripes on or near lateral sutures of median occipital sclerite. Mesonotum with presutural lateral pale stripe usually complete from pos-

terior margin of postpronotal lobe to posterior part of notopleuron (Figs. 7B–D), rarely narrowly interrupted on scutum. S. Texas to Costa Rica 9

8. Notopleuron with pale posterior spot, but presutural lateral pale stripe absent on scutum (Fig. 7H). Dorsocentral pale stripe present. Wing with broad, faint brown band extended from cell bcu only to middle of cell cu_1 (Fig. 5G). Crossvein dm-cu with faint brown band. Abdomen with pale medial stripe at least slightly expanded on apical half of syntergite 1+2, never connected to transverse medial band on syntergite 1+2; tergites with narrow white lateral margins (Figs. 9E–F). W. Venezuela, Ecuador, Paraguay, Brazil (Bahia, Rio Grande do Norte) . . . . . *macrura* Hendel

– Notopleuron entirely brown, but presutural lateral pale stripe present on scutum as spot anterolateral to presutural supra-alar seta (Fig. 8F). Dorsocentral pale stripe absent. Wing with broad, moderate brown band extended from cell bcu to apex of cell cu_1 (Fig. 5H). Crossvein dm-cu without faint brown band. Abdomen with pale medial stripe not expanded on apical half of syntergite 1+2, sometimes connected to transverse medial band on syntergite 1+2; tergites without narrow white lateral margins (Fig. 9I). Brazil (Roraima) . . . . . *zucchii*, n. sp.

9. Wing in cell br with costal band broadly extended to vein M along entire length of cell bm (Figs. 5A–B); cell br mostly microtrichose including most or all of section bordering cell bm. Posterior pale marks on abdominal tergites 3 and 4 more or less triangular (Fig. 9B). Costa Rica 10

– Wing in cell br with costal band not extended to vein M along cell bm (Fig. 5C); cell br half microtrichose to mostly bare, section bordering cell bm with at least posterior half bare. Posterior pale marks on abdominal tergites 3 and 4 transversely elongate (Fig. 9C). S. Texas to Costa Rica . . . . . *bicolor* (Stone)

10. Syntergosternite 7 less than 5 mm long, less than 1.5 times mesonotum length. Scutum with broad medial nonmicrotrichose area extended to expanded posterior part of medial pale stripe and sublateral stripes; medial pale stripe with posterior arms moderately slender and with anterolateral corners (Fig. 7C). Scutellum with basal seta at margin of brown area or within yellow area (Fig. 7C). Frons with orbital seta at margin or anterior to dorsal brown band . . . . . *avispa*, n. sp.

– Syntergosternite 7 more than 7 mm long, more than 1.7 times mesonotum length. Scutum microtrichose except for medial presutural bare area and very narrow dorsocentral stripe; medial pale stripe with posterior arms very slender and usually without anterolateral corners (Fig. 7B). Scutellum with basal seta within brown area (Fig. 7B). Frons with orbital seta at margin or within dorsal brown band . . . . . *aquila*, n. sp.

11. Scutum with pale dorsocentral stripe connected anteriorly to pale area on postpronotal lobe (Fig. 7G); microtrichose only on and lateral to sublateral stripe, and on and posterior to expanded posterior part of medial pale stripe. Occiput mostly yellow, usually with pair of small brown dorsal stripes. Propleuron and base of syntergite 1+2 yellow. Syntergosternite 7 length 3.95–5.00 mm, 1.25–1.65 times mesonotum length. Venezuela . . *katiyari*, n. sp.

– Scutum with pale dorsocentral stripe separated anteriorly from pale area on postpronotal lobe (Fig. 7E–F); microtrichose except for medial presutural bare area. Occiput mostly brown except anterior margin. Propleuron brown. Base of syntergite 1+2 orange to brown. Syntergosternite 7 length 2.10–3.50 mm, 0.75–1.30 times mesonotum length. S. Brazil, Paraguay, Argentina 12

12. Mesonotum with presutural lateral pale stripe complete, extended from postpronotal lobe to posterior part of notopleuron (Fig. 7F). Syntergosternite 7 length 2.10–2.70 mm, 0.75–1.00 times mesonotum length. Abdominal tergites 3 and 4 each with narrow apical white band. S. Brazil, Paraguay, Argentina . . . . . *daciformis* Bezzi

– Mesonotum with presutural lateral pale stripe reduced to pale spot on posterior part of notopleuron, absent from scutum (Fig. 7E). Syntergosternite 7 length 2.95–3.49 mm, 1.10–1.30 times mesonotum length. Abdominal tergite 3 sometimes with small apical white band, tergite 4 without apical white band. Brazil (Mato Grosso do Sul), Argentina . . . . . *castanea*, n. sp.

Anastrepha antilliensis Norrbom, new species

(Figs. 6A, 7A, 9A)

Diagnosis.—This species differs from all other species of the *daciformis* group as follows: scutum (Fig. 7A) with medial pale stripe rounded posteriorly; and sublateral pale stripe not extended to intra-alar seta. The posterior orbital seta, usually absent in other species of the group, is usually present.

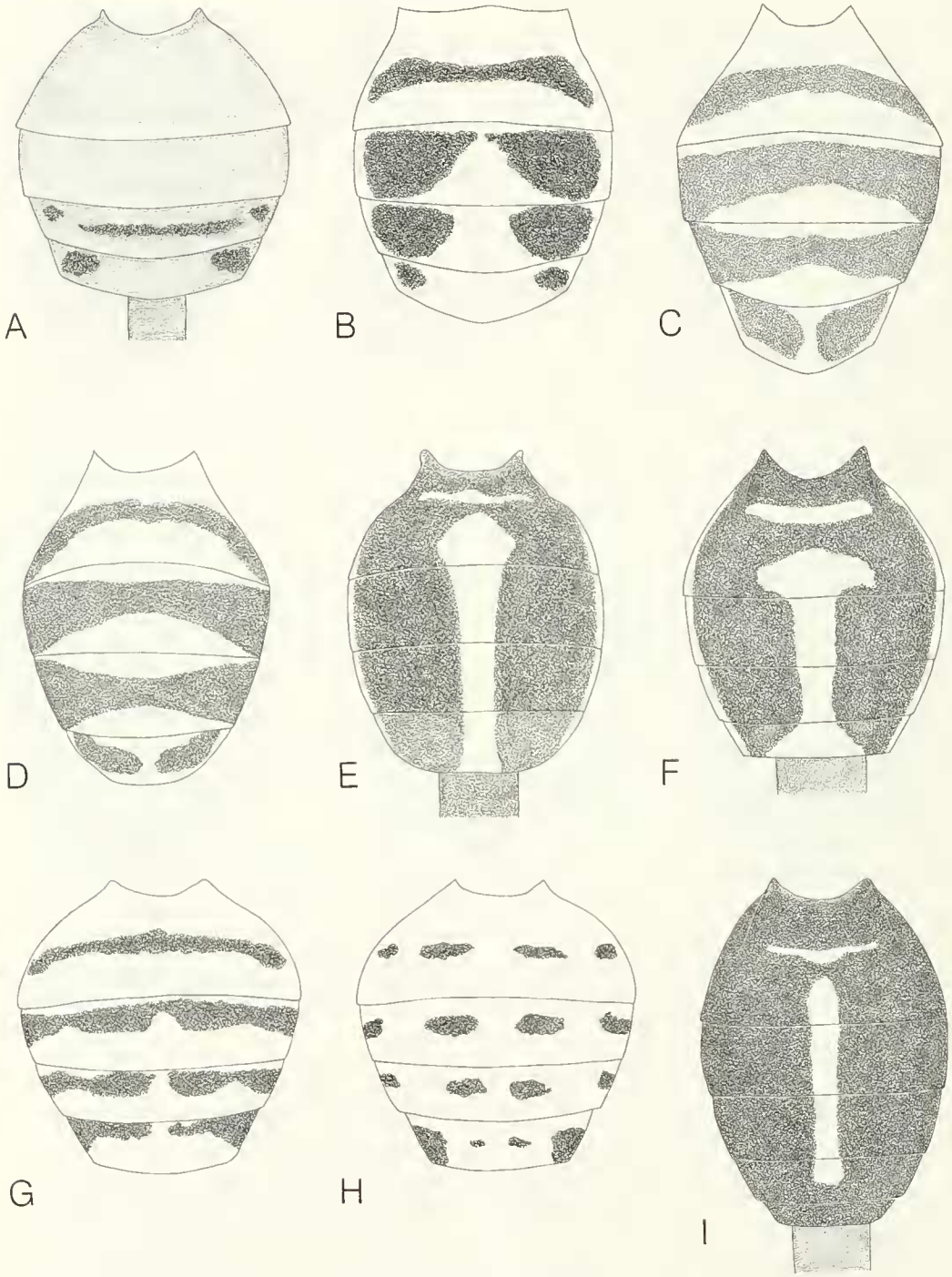

Fig. 9. Abdomen, dorsal view. A, *A. antilliensis* (♀ Fortuna Exp. Station, Puerto Rico). B, *A. avispa* (♀ 20 km. S. Upala, Costa Rica). C, *A. bicolor* (♂ Harlingen, Texas). D, *A. katiyari* (♂ Pringamora, Venezuela). E–F, *A. macrura* (♀ San Bernardino, Paraguay; ♀ Rancho Grande, Venezuela). G–H, *A. stonei* (♂ Holmes Rock, Bahamas; ♂ New Providence, Bahamas). I, *A. zucchii* (♀ Ilha de Maraca, Brazil).

Description.—Body predominantly yellow. *Head:* Entirely yellow except ocellar tubercle brown. 2 orbital setae (1♂ from Dominican Republic has 2 on right side, 1 on left). *Thorax* (Fig. 7A): Scutum with 2 dark brown lateral spots, one anterior to and one posterolateral to postsutural supra-alar seta, and with large, irregular dark brown area on posterior margin, extending to or almost to acrostichal and dorsocentral setae and including intra-alar setae. Medial pale stripe poorly differentiated anteriorly, rounded or acute posteriorly. Presutural dorsocentral pale stripe absent. Presutural lateral pale stripe poorly differentiated, appears to extend across scutum, but absent from notopleuron. Sublateral pale stripe ending at margin of dark brown area, not extended to intra-alar seta. Scutellum largely dark brown, often with small orange area around basal seta, and with medial and apical white area, sometimes divided, in Dominican Republic specimens diffuse and sometimes reduced to medial area. Anepimeron with medial dark brown spot, but pleuron otherwise without dark markings. Subscutellum and mediotergite entirely dark brown. Scutum nonmicrotrichose except lateral margin of postsutural part lateral to postsutural supra-alar seta; notopleuron mostly microtrichose; scutellum nonmicrotrichose. *Wing* (Fig. 6A): Bands yellow, orange and brown. C- and S-bands separated. S-band complete, basally with broad extension across vein Cu_2+A_1 to posterior wing margin; subapically narrow, hyaline area in cell r_{2+3} extended to vein R_{2+3}; apically broad, extended to apex of vein M. V-band extended anteriorly to vein R_{4+5}, not connected to S-band; distal arm absent. Vein M relatively weakly curved apically, sometimes meeting costa at slight angle; M ratio 1.75–2.06. *Abdomen* (Fig. 9A): Mostly yellow. Tergite 4 with nearly complete transverse brown stripe or with only paired lateral brown spot; tergite 5 with paired lateral brown spot. *Female terminalia:* Syntergosternite 7 length 2.25–2.75 mm, 1.10–1.25 times as long as mesonotum. Aculeus length 2.39 mm; tip with several minute apical serrations, length 0.16 mm, width 0.02 mm.

Remarks.—The species name refers to its known distribution, two islands of the Greater Antilles.

Distribution.—Dominican Republic, Puerto Rico.

Types.—Holotype: ♀ (USNM) PUERTO RICO: San Juan, Puerta de Tierra, 26.IV.1995, McPhail trap in mango, N. Martinez & A. Arche. Paratypes. DOMINICAN REPUBLIC: Pedernales: 37 km N Cabo Rojo [Las Abejas forest], 18°09'N 71°35'W, 1500 m, 11.VII.1987, R. Davidson & J. Rawlins, 1♂1♀ (CMP); Las Abejas cloud forest, 30 km N Cabo Rojo, 1300 m, 17.I.1989, J.E. Swann, 1♂ (DEBUG). PUERTO RICO: Ponce, Fortuna Exp. Station, "*Mangifera indica* McPhail trap", 28.III.1994, W. Vega, 1♀ (USNM).

Anastrepha aquila Norrbom, new species
(Figs. 5A, 7B)

Diagnosis.—This species, *avispa*, and *zucchii* differ from *bicolor* and *macrura* in having the costal band broadly extended in cell br to vein M and this section of br microtrichose. It and *avispa* are intermediate in abdominal pattern between the stripe or T-shaped mark found in *macrura* and *zucchii* and the banded pattern of *bicolor*. It differs from *avispa* by the characters listed in the key. See diagnosis of *zucchii* for characters to distinguish *aquila* from that species.

Description.—Body predominantly dark brown. *Head:* Mostly yellow. Frons with brown transverse dorsal band, usually more or less rectangular or rounded anteriorly, broad, orbital seta at margin or within band. Gena with large brown spot below eye. Occiput yellow with brown stripes on or near sutures of median occipital sclerite. Posterior orbital seta absent. *Thorax* (Fig. 7B): Medial pale stripe strongly bilobed posteriorly, lobes very slender, extended to or almost to dorsocentral seta, rarely with dis-

tinct anterolateral corner. Presutural dorsocentral pale stripe broadly connected anteriorly to pale area on postpronotal lobe, and connected to or narrowly separated from pale sublateral stripe. Presutural lateral pale stripe well differentiated, complete or rarely narrowly interrupted on scutum, but present on posterior part of notopleuron. Pleuron brown except following yellow areas: all of propleuron (except 1♀ with small dorsal brown spot); anteroventral corner and posterodorsal half of anepisternum; dorsal band, often narrowed medially, rarely interrupted, on katepisternum; katepimeron; anterior ¼ of meron; anterior ⅔ of katatergite; and most of anatergite. Subscutellum and mediotergite entirely dark brown. Scutum microtrichose except very narrow paired stripe from medial end of transverse suture to dorsocentral seta, and presutural area on, between and usually slightly lateral to dorsocentral pale stripes, at most extended to transverse suture medially; notopleuron microtrichose; scutellum microtrichose except small basal area on side. *Wing* (Fig. 5A): C- and S-bands completely fused along costa to form broad, uninterrupted, dark orange-brown marginal band; in cell br extended to vein M along cell bm; covering all of cells r_1 and r_{2+3} and anterior margin of cell r_{4+5}; well separated from apex of vein M. S-band incomplete, middle part between veins R_{4+5} and Cu_1 absent; basal part paler than C-band; extended over base of cell cu_1 and faintly and diffusely along both sides of vein Cu_1 to fuse with V-band. V-band pale and diffuse; extended anteriorly only slightly into cell r_{4+5}; distal arm absent. Vein M strongly curved apically; M ratio 1.64–1.89. Cell br mostly to entirely microtrichose. Cell bcu mostly to entirely microtrichose, posteroapical lobe entirely microtrichose. *Abdomen:* Syntergite 1+2 with base yellow and uninterrupted medial brown band. Tergites 3–5 with posteromedial yellow areas triangular; brown area on tergite 3 continuous, brown areas on tergite 4 usually separated; tergites 2–5 with distinct lateral yellow margins. *Female terminalia:* Syntergosternite 7 length 7.32–7.78 mm, 1.83–2.0 times as long as mesonotum. Aculeus length 6.41 mm; tip nonserrate, length 0.17–0.18 mm, width 0.040–0.045 mm.

Remarks.—The species name refers to its largely swarthy color.

Distribution.—Costa Rica.

Types.—Holotype: ♀ (INBio001908656), COSTA RICA: Guanacaste: P. N. Guanacaste, A. C. Guanacaste, Sector Las Pailas, 800 m., 6–26.VI.1994, K. Taylor. Paratypes. COSTA RICA: Alajuela: 20 km. S of Upala, 16.X.1990, F.D. Parker, 1♂ (USU). Guanacaste: P. N. Guanacaste, 9 km S Sta. Cecilia, Est. Ptilla, 700 m., 21.III-6.IV.1993, C. Moraga, 1♀ (USNM) (INBio001391700); Sector Hornillas, 1000 m, 15–20.VIII.Aug 1994, D. Garcia, 1♀ (USNM) (INBio002305488); Parq. Nac. Rincón de la Vieja, Est. Las Pailas, 800 m, 5–24.VIII.1994, D.G. Garcia, 1♀ (INBio002038585); 3.5 km SSW of Volcán Rincón de la Vieja, Sector Sendero Volcán, 1100 m, 9–10.VI.1994, D. Garcia, 1♂ (USNM) (INBio002130780). Puntarenas: Res. Biol. Monteverde, Est. La Casona, 1520 m, 3–24.IV.1995, A. Azofeifa, 1♂1♀ (INBio002452986, 002452990).

Anastrepha avispa Norrbom, new species

(Figs. 5B, 7C, 9B)

Diagnosis.—This species, *aquila*, and *zucchii* differ from *bicolor* and *macrura* in having the costal band broadly extended in cell br to vein M and this section of br microtrichose. It and *aquila* are intermediate in abdominal pattern between the stripe or T-shaped mark found in *macrura* and *zucchii* and the banded pattern of *bicolor*. It differs from *aquila* by the characters listed in the key. See diagnosis of *zucchii* for characters to distinguish *avispa* from that species.

Description.—Body predominantly dark brown. *Head:* Mostly yellow. Frons with brown transverse dorsal band, usually more or less rectangular, narrow to moderately

broad, orbital seta at margin or anterior to band. Gena with large brown spot below eye. Occiput entirely yellow or with lateral brown spots or stripes on median occipital sclerite. Posterior orbital seta absent (of 18 specimens with intact head setae, present on one side only on 1♂). *Thorax* (Fig. 7C): Medial pale stripe strongly bilobed posteriorly, lobes extended to dorsocentral seta, moderately slender but broader than in *aquila* and with more distinct anterolateral corner. Presutural dorsocentral pale stripe broadly connected anteriorly to pale area on postpronotal lobe, and connected or narrowly separated from pale sublateral stripe. Presutural lateral pale stripe well differentiated, complete, including posterior part of notopleuron. Pleuron brown except ventral half or more of katepisternum orange, and following yellow areas: all of propleuron; anteroventral corner and posterodorsal half of anepisternum; dorsal band, often narrowed or interrupted medially, on katepisternum; katepimeron; anterior ¼ of meron; anterior ⅔ of katatergite; and most of anatergite. Scutellum with brown area relatively narrow, basal scutellar seta at margin of brown area or usually within yellow area. Subscutellum and mediotergite entirely dark brown. Scutum without microtrichia medially, microtrichose only on and narrowly bordering presutural lateral stripe, on and lateral to sublateral stripe, and posteriorly from level of expanded posterior part of medial stripe; notopleuron microtrichose; scutellum microtrichose except small basal area on side. *Wing* (Fig. 5B): C- and S-bands completely fused along costa to form broad, uninterrupted, moderate to dark orange-brown marginal band; in cell br extended to vein M along cell bm; covering all of cells r_1 and r_{2+3} and anterior margin of cell r_{4+5}; well separated from apex of vein M. S-band incomplete, middle part between veins R_{4+5} and Cu_1 absent; basal part paler than C-band; extended over base of cell cu_1 and usually faintly and diffusely (fainter than in *aquila*) along both sides of vein Cu_1 to fuse with V-band. V-band pale and diffuse; extended anteriorly only slightly into cell r_{4+5}; distal arm absent. Vein M strongly curved apically; M ratio 1.50–1.92. Cell br mostly to entirely microtrichose. Cell bcu mostly to entirely microtrichose, posteroapical lobe entirely microtrichose. *Abdomen* (Fig. 9B): Syntergite 1+2 with base yellow and uninterrupted medial brown band. Tergites 3–5 with posteromedial yellow areas triangular; brown area on tergite 3 usually continuous (separated in 2 of 21 specimens), brown areas on tergite 4 usually separated; tergites 2–5 with distinct lateral yellow margins. *Female terminalia:* Syntergosternite 7 length 3.91–4.75 mm, 1.17–1.34 times as long as mesonotum. Aculeus length 3.54–3.99 mm; tip with several minute apical serrations, length 0.17, width 0.04–0.05 mm.

Remarks.—The species name, from the Spanish for wasp, refers to the wasplike appearance of this species and its closest relatives.

Distribution.—Costa Rica. C.A. Korytkowski (pers. comm.) has examined specimens from Altos de Pacora, 800 m, Cerro Azul, Panama in the Universidad de Panama collection that may be this species.

Types.—Holotype: ♀ (INBio000410954), COSTA RICA: Guanacaste: P. N. Guanacaste, SW side Volcan Cacao, Est. Cacao, 1000–1400 m., 21–29.V.1992, M.A. Zumbado. Paratypes. COSTA RICA: Alajuela: 20 km. S of Upala, 11.XII.1990, F.D. Parker, 1♂1♀ (USU); same, 25.XII.1990, F.D. Parker, 1♀ (USU); same, 1–20.XI.1990, F.D. Parker, 1♀ (USU). Guanacaste: P. N. Guanacaste, Est. Cacao, 1100 m., 8–18.II.1995, M. Moraga, 1♂ (INBio002185179); same, 7–18.II.1995, F. Alvarado, 1♀ (INBio002196019); P. N. Guanacaste, 2 km SW Cerro Cacao, Est. Cacao, 1000–1400 m., 8–17.II.1995, M.A. Zumbado, 1♀ (INBio002324003); P. N. Guanacaste, 9 km S Sta. Cecilia, Est. Ptilla, 700 m., IX.1991, P. Rios, 1♀ (INBio000601097); same, VII.1991, P. Rios, 1♂1♀ (INBio000336542, 000336553); same, 27.VII-14.VIII.1992, P. Rios, 1♀ (USNM) (INBio000778619); same, VII.

1988, GNP Biodiversity survey, 1♂ (INBio000129404); same, XII.1994, P. Rios, 2♀ (USNM) (INBio002136935, 002136941); same, XII.1995, M. Moraga, 1♀ (USNM) (INBio002379513); W side Volcan Orosi, Est. Maritza, 600 m., 27.II-10.III.1992, F.A. Quesada or R. Vargas, 1♂1♀ (USNM) (INBio000814582, 000468319); same, 28.II-10.III.1992, R. Guzman, 1♂ (INBio000441334); same, VI.1990, R. Blanco, 1♀ (USNM) (INBio000233969); 3 km. SE of Rio Naranjo, 1–9.VI.1993, F.D. Parker, 1♀ (USU).

Anastrepha bicolor (Stone)
(Figs. 5C, 7D, 9C)

Pseudodacus bicolor Stone 1939: 288 [description]; Baker et al. 1944: 118 [Mexico]; Aczél 1950: 236 [catalog]; Wasbauer 1972: 125 [list]; Foote 1965: 674 [catalog], 1967: 39 [catalog].

Anastrepha bicolor: Steyskal 1977b: 3 [key]; Norrbom 1985: 119 [taxonomy]; Norrbom and Kim 1988: 1 [classification]; Hernández-Ortiz 1992: 55 [Mexico]; Foote et al. 1993: 91 [USA].

Diagnosis.—This species differs from *macrura* and *zucchii* in having the presutural lateral stripe complete. It differs from *aquila, avispa* and *zucchii* in having the posterior half of the part of cell br bordering bm hyaline and bare of microtrichia. Its banded abdominal pattern clearly distinguishes *bicolor* from *macrura* and *zucchii*, in which the abdomen is brown with a pale stripe or T-shaped mark, and less so from *aquila* and *avispa*, which are intermediate in abdominal pattern.

Description.—Body predominantly dark orange-brown to dark brown. *Head:* Mostly yellow. Frons with brown transverse dorsal band, usually more or less rectangular, narrow to moderately broad, orbital seta at margin or anterior to band. Gena with large brown spot below eye. Occiput entirely yellow. Posterior orbital seta usually absent (of 38 specimens with intact head setae, absent except in 1♂ from Morelos, and on one side only on 1♀ from Sinaloa). *Thorax* (Fig. 7D):Medial pale stripe bilobed posteriorly, lobes moderately slender, often with distinct anterolateral corner, usually extended to dorsocentral seta. Presutural dorsocentral pale stripe connected anteriorly to pale area on postpronotal lobe and connected or narrowly separated from pale sublateral stripe. Presutural lateral pale stripe well differentiated, complete, including posterior part of notopleuron. Pleuron brown except following yellow areas: all of propleuron; anteroventral corner and posterodorsal half of anepisternum; dorsal band or 2 spots on katepisternum; katepimeron; anterior ¼ of meron; anterior ⅔ of katatergite; and most of anatergite. Subscutellum and mediotergite entirely brown, or mediotergite occasionally dark orange medially. Scutum without microtrichia except on anterior part of sublateral stripe, lateral to sublateral stripe and posterior to dorsocentral seta; notopleuron usually partly microtrichose; scutellum microtrichose except basal area on side. *Wing* (Fig. 5C): C- and S-bands completely fused along costa to form broad, uninterrupted, orange to dark orange-brown marginal band; in cell br at most covering anterior half of section bordering cell bm, not extended to vein M; covering all of cells r_1 and r_{2+3} and anterior margin of cell r_{4+5}; well separated from apex of vein M. S-band incomplete, middle part between veins R_{4+5} and Cu_1 absent; basal part paler than C-band; extended over base of cell cu_1 and faintly and diffusely along vein Cu_1 up to halfway to dm-cu, sometimes extended into cell dm towards r-m. V-band pale and diffuse; extended anteriorly only slightly into cell r_{4+5}; distal arm absent. Vein M strongly curved apically; M ratio 1.57–2.33. Cell br about half microtrichose (some Texas specimens) to mostly bare, section bordering cell bm with at least posterior half bare. Cell bcu with anterior margin and medial crease microtrichose, always with large bare areas anterior and posterior to crease, posteroapical lobe bare to entirely microtrichose. *Abdomen* (Fig. 9C): Tergites

banded; base of syntergite 1+2 yellow; it and tergites 3–5 with posteromedial yellow areas broad, and, except often on tergite 5, with brown areas undivided medially; tergites usually without lateral yellow margins, but present in some Mexican and all Central American specimens. *Female terminalia:* Syntergosternite 7 length 3.58–6.45 mm, 1.17–1.86 times as long as mesonotum. Aculeus length 3.22–5.57 mm; tip nonserrate, length 0.15–0.21 mm, width 0.04–0.05 mm.

Remarks.—The length of the female terminalia is considerably greater among the specimens here recognized as *bicolor* than in any other species of the *daciformis* group (see Table 2). This does not appear to be due to sampling error, as the variation in the similar sized sample of *pallens* is much lower, although this species has a similar distribution to *bicolor*. Arbitrarily dividing the sample by syntergosternite 7 length greater than or less than 5 mm (see Table 2, "*bicolor* long", "*bicolor* short") yields samples with variation similar to that in other species. The "long" sample includes all of the Morelos females and single females from Chamela, Jalisco and Rosario, Sinaloa. It is possible that the individuals with longer terminalia represent a cryptic species, but without host data or better samples to support this hypothesis, I continue to recognize them as *bicolor*.

Distribution.—USA (southern Texas) to Costa Rica. In Mexico also reported from Nayarit (Hernández-Ortíz 1992).

Specimens examined.—Holotype ♀ (USNM, no. 53330), U.S.A.: Texas: Edinburg, 20.X.1937. Other specimens—COSTA RICA: Guanacaste: 8 km SW Cuajinquil, Est. Murcielago, 100 m., II.1989, GNP Biodiversity Survey, 1♂ (INBio001054196). GUATEMALA: Escuintla: Palín, Km. 36.5, Granja El Coronel, McPhail trap, 26.III.1992, J. López, 1♀ (López); same, I.1992, 1♂ (USNM). MEXICO: Chiapas: Mazapa de Madero, II.1984, E. Rios, 1♂ (USNM). Guererro: S.A. Ahuehuepan, 14.IV.1989, A.M. Real, E. Real & P. Santana, 1♀ (IEXV); Iguala, Finca Aurora, VII.1987, Z. Figueroa, 1♂ (UNAM); Tlaxmalac, 26.I.1989, A.M. Real, E. Real & P. Santana, 1♂ (IEXV). Jalisco: Est. Biol. Chamela, 1–8.IV.1992, E. Ramírez, 2♀ (IEXV); same, 8.VI.1992, 2♂4♀ (IEXV). Morelos: Cañon de Lobos, 5.I-2.II.1961, C. Benschoter, 3♂6♀ (USNM); Coatlán del Río, 4.III.1987, M.Y. Serna, 1♀ (UNAM); Cocoyoc Golf, V-VI.1957, 4♂3♀ (USNM); Cuernavaca, 1♀ paratype (USNM); Cuernavaca, Jardin Borda, I.1958, 1♂2♀ (USNM). Oaxaca: vic. Palomares, 11.VIII.1980, E. Giesbert, 1♀ (FSCA). Sinaloa: Rosario, I.1987, Rendón, 2♀ (IEXV). Sonora: Muatabampo, McPhail trap, 3.VIII.1988, E. Melchor Ocampo, IRL-130–88, 1♂ (Riley). Veracruz: Apazapan, 19.IV.1991, G. Quintero & L. Quiroz, 1♀ (IEXV); same, 24.VI.1992, 1♂ (IEXV); Apazapan, 26.VI.1991, V. Hernández & L. Quiroz, 1♀ (IEXV). U.S.A.: Texas: Cameron Co.: Harlingen, 28.I.1937 or 28.XII.1937, W.R. Head, 2♂ paratypes (USNM); Harlingen, 13.XII.1937, E.H. Achilles, 1♂ paratype (USNM); San Benito, 1♂ paratype (USNM). Hidalgo Co.: 11.XI.1935, F.C. Champion, 1♂ paratype (USNM); Alamo, 13.I.1937, 1♂ paratype (USNM); McAllen, 5.XI.1934, B.C. Stevenson, 1♂ paratype (USNM); Weslaco, 7.XI.1934, 1♀ paratype [genitalia slide only] (USNM).

Anastrepha castanea Norrbom, new species

(Figs. 5D, 7E)

Diagnosis.—This species is most similar to *daciformis* and *katiyari*, but differs in having the lateral presutural pale stripe interrupted and absent from the scutum (i.e., pale area on postpronotal lobe not connected to pale area on posterior half of notopleuron), and in having the white markings of the abdomen reduced, with no apical band or spot on tergite 4. The female terminalia are longer than in *daciformis*, but shorter than in *katiyari* (see Table 2).

Description.—Body predominantly red-brown to dark brown. *Head:* Yellow and brown. Frons with brown transverse dorsal

band, moderately broad, somewhat bilobed, broadest along eye margin where it extends anteriorly beyond level of orbital seta. Gena with large brown spot below eye. Occiput brown except anterior margin and narrowly dorsomedially. Posterior orbital seta absent. *Thorax* (Fig. 7E): Medial pale stripe bilobed or triangular posteriorly, not extended to dorsocentral seta. Presutural dorsocentral pale stripe isolated anteriorly from pale area on postpronotal lobe and not connected posteriorly to sublateral stripe along transverse suture. Presutural lateral pale stripe well differentiated, incomplete, middle part absent from scutum, but present on posterior part of notopleuron. Pleuron brown except following yellow areas: posterodorsal third of anepisternum; two small dorsal spots on katepisternum; katepimeron; anterior ⅔ of katatergite; and most of anatergite. Subscutellum and mediotergite entirely dark brown. Scutum microtrichose except for medial presutural bare area on and between dorsocentral stripes, at most extended halfway to transverse suture; notopleuron microtrichose; scutellum entirely microtrichose except for small basal area on side. *Wing* (Fig. 5D): C- and S-bands completely fused along costa to form narrow, uninterrupted, dark brown marginal band; in cell br not extended to vein M along cell bm; covering all of cell r_1, but cells r_{2+3} and r_{4+5} hyaline except apically; apically narrow, but extended to or almost to apex of vein M. S-band incomplete, middle part between veins R_{2+3} and Cu_1 absent; basal part as dark as C-band but hyaline or very faintly infuscated in posterior third or more of cell bcu. V-band as dark as C-band, extended anteriorly at most slightly into cell r_{4+5}; distal arm absent. Vein M strongly curved apically; M ratio 1.25–1.49. *Abdomen:* Tergites, including base of syntergite 1+2 and lateral margins of all tergites, dark red-brown except for medial and apical white bands on syntergite 1+2 and sometimes a medial white band on posterior margin of tergites 3 and anterior margin of tergite 4. *Female terminalia:* Syntergosternite 7 length 2.95–3.49 mm, 1.11–1.29 times as long as mesonotum. Aculeus not dissected in Argentine females; at least 2.66 mm long in Brazilian female, but broken and tip missing.

Distribution.—Southern Brazil, Argentina.

Types.—Holotype: ♀ (INTA), ARGENTINA: Corrientes: Bella Vista, "s/ citrus", XII.1944, Silbermann. Paratypes. Same data as holotype, 1♂ (INTA) 1♂1♀ (USNM). BRAZIL: Mato Grosso do Sul: Terenos, Colonia Jamic, Fazenda Varzea Alegre, McPhail trap in tangerine orchard, 31.XII.1995, M.A. Uchoa F., 1♀ (USP).

Anastrepha daciformis Bezzi
(Figs. 1B, 2A–B, 5E, 7F)

Anastrepha daciformis Bezzi 1909: 282 [description]; Greene 1934: 143 [taxonomy]; Blanchard 1937: 41 [Argentina]; Lima 1938: 64 [illustration]; Stone 1942: 10; Hayward 1942, 1960 [host]; Steyskal 1977b: 3 [key]; Zucchi 1978: 41 [taxonomy, Brazil]; Norrbom 1985: 115 [taxonomy]; Norrbom and Kim 1988: 1 [classification], 16 [host list]; White and Elson-Harris 1992: 163 [host list]

Anastrepha (Pseudodacus) daciformis: Hendel 1914a: 66 [key], 1914b: 13 [key]; Bezzi 1919a: 6, 1919b: 373 [Brazil]; Lima 1934: 493 [Brazil, type data].

Pseudodacus daciformis: Stone 1939: 286 [revision]; Aczél 1950: 237 [catalog]; Rosillo 1953: 105 [Argentina]; Blanchard 1961: 293 [Argentina]; Foote 1967: 39 [catalog].

Diagnosis.—This species most closely resembles *castanea* and *katiyari*, which differ as indicated in the key. *A. daciformis* also has a larger M ratio (see Table 1).

Description.—Body predominantly dark orange-brown to red-brown. *Head:* Mostly yellow. Frons with brown transverse dorsal band, moderately broad, usually bilobed, broadest along eye margin where it extends anteriorly beyond level of orbital seta. Gena with large brown spot below eye. Occiput

brown except anterior margin and sometimes narrowly dorsomedially, in teneral specimens brown only dorsally. Posterior orbital seta absent (of 22 specimens with intact head setae, present on one side only on 1 ♀). *Thorax* (Fig. 7F):Medial pale stripe bilobed or triangular posteriorly, not extended to dorsocentral seta. Presutural dorsocentral pale stripe isolated anteriorly from pale area on postpronotal lobe and not connected posteriorly to sublateral stripe along transverse suture. Presutural lateral pale stripe well differentiated, complete, including posterior part of notopleuron. Pleuron brown except following yellow areas: posterodorsal third of anepisternum; two small dorsal spots on katepisternum; katepimeron; anterior ⅔ of katatergite; and most of anatergite. Subscutellum and mediotergite entirely brown. Scutum microtrichose except for medial presutural bare area on and between dorsocentral stripes, at most extended halfway to transverse suture; notopleuron microtrichose; scutellum entirely microtrichose except for small basal area on side. *Wing* (Fig. 5E): C- and S-bands completely fused along costa to form narrow, uninterrupted, brown to dark brown marginal band; in cell br not extended to vein M along cell bm; covering all of cell r_1, but cells r_{2+3} and r_{4+5} hyaline except apically; apically narrow, separated from or occasionally extended to apex of vein M. S-band incomplete, middle part between veins R_{2+3} and Cu_1 absent; basal part as dark as C-band but hyaline or very faintly infuscated in posterior third or more of cell bcu. V-band as dark as C-band, extended anteriorly at most slightly into cell r_{4+5}; distal arm absent. Vein M strongly curved apically; M ratio 1.52–2.00. *Abdomen:* Tergites, including lateral margins, red-brown; except for male tergite 5, each with narrow apical pale band. Syntergite 1+2 also with small medial pale band; brown or orange basally. *Female terminalia:* Syntergosternite 7 length 2.12–2.70 mm, 0.75–0.98 times as long as mesonotum. Aculeus length 1.79–2.20; tip finely serrate apically, length 0.11–0.15 mm, width 0.025–0.03 mm.

Host plants.—This species was reported to attack "duraznero" (presumably *Prunus persica* (L.) Batsch (Rosaceae)), "guayabo" (presumably *Psidium guajava* L.) and *Eugenia* sp. (Myrtaceae), and citrus (*Citrus* sp. (Rutaceae)) in Argentina (Hayward 1942, 1960, Rosillo 1953, Blanchard 1961), but all of these records are doubtful. Blanchard said that Rosillo and Hayward both reared specimens, but although Rosillo used the word "hospedero" in his tables, his data appear to be exclusively based on trap counts. I have not seen the Hayward papers, but I suspect that these records are also based on trap data.

Type data.—Bezzi described *daciformis* from "parecchi esemplari" (several specimens) of both sexes from "S. Paolo, Brasile" (São Paulo, Brazil) from G.G. Barbiellini in the "Mus. di Budapest e mia coll." The only specimens of *daciformis* now in the MNM are from Paraguay, so the MNM syntypes must have been lost or were never returned by Bezzi. The lectotype male in the MCSNM has only a small green label with "327" and "Anastrepha daciformis n. sp." in Bezzi's writing. The female paralectotype has only a small green label with "54." The specimens are accompanied by a label on a separate pin with "Anastrepha daciformis typ. Bezzi" in Bezzi's writing. I designate the male as lectotype because it is in good condition, whereas the female is slightly teneral and missing the right foreleg and most of both antennae.

Distribution.—Southern Brazil, Paraguay, Argentina. C.A. Korytkowski (pers. comm.) has examined a male from Pocitos, Salta, Argentina in the Universidad de Panama collection.

Specimens examined.—Lectotype ♂, here designated, and paralectotype ♀, (MCSNM), BRAZIL: São Paulo, G.G. Barbiellini. Other specimens—ARGENTINA: Jujuy: Ledesma, 1♀ (USNM). Salta: Oran, 9.VIII.1955, 2♀ (INTA). Tucumán: Tucumán, 6.1.1936, 2♂ (INTA). BRAZIL: Com-

pere, 1♂1♀ (USNM). Mato Grosso, Rohde, 1♀ (ZMHU). Rio Grande do Sul: Santa Cruz, 10.VII.1895, Stieglmayr, 1♀ (NMW). São Paulo, 26.XII.1931, M. Kisliuk & C. Cooley, 11♂5♀ (USNM). PARAGUAY: Asuncion, 23.X.1904, Vezenyi, 2♂3♀ (MNM) 1♀ (USNM).

Anastrepha katiyari Norrbom, new species
(Figs. 5F, 7G, 9D)

Diagnosis.—This species is most similar to *daciformis* and *castanea,* but differs as follows: Presutural dorsocentral pale stripe broadly connected anteriorly to pale area on postpronotal lobe; propleuron yellow; female terminalia longer (see Table 2); base of syntergite 1+2 yellow; and scutum largely nonmicrotrichose.

Description.—Body predominantly dark orange-brown to dark brown. *Head:* Mostly yellow. Frons with brown transverse dorsal band, more or less rectangular and not extended beyond orbital seta or bilobed and broadest along eye margin where it extends anteriorly beyond level of orbital seta. Gena with large brown spot below eye. Occiput yellow, with lateral brown spots or stripes on median occipital sclerite or area bordering it. Posterior orbital seta usually absent (present on one or both sides in 3 of 13 ♂ and on one side only on 3 of 10 ♀). *Thorax* (Fig. 7G): Medial pale stripe bilobed posteriorly, lobes stout to moderately slender, not extended to dorsocentral seta. Presutural dorsocentral pale stripe broadly connected anteriorly to pale area on postpronotal lobe, and connected or narrowly separated from pale sublateral stripe. Presutural lateral pale stripe well differentiated, complete, including posterior part of notopleuron. Pleuron brown except following yellow areas: all of propleuron; anteroventral corner and posterodorsal half of anepisternum; two small dorsal spots on katepisternum, anterior one sometimes very small; katepimeron; anterior ¼ of meron; anterior ⅔ of katatergite; and most of anatergite. Subscutellum and mediotergite entirely brown or occasionally both orange medially. Scutum without microtrichia medially, microtrichose only on and lateral to sublateral stripe, and on and posterior to expanded posterior part of medial pale stripe; notopleuron microtrichose; scutellum entirely microtrichose except small basal area on side. *Wing* (Fig. 5F): C- and S-bands completely fused along costa to form narrow, uninterrupted, orange and brown marginal band; in cell br not extended to vein M along cell bm; covering all of cell r_1, but cells r_{2+3} and r_{4+5} hyaline except apically; apically narrow, but extended to apex of vein M. S-band incomplete, middle part between veins R_{2+3} and Cu_1 absent; basal part as dark as C-band but hyaline or very faintly infuscated in posterior third or more of cell bcu. V-band as dark as C-band, extended anteriorly no more than ⅓ distance across cell r_{4+5}; distal arm absent. Vein M strongly curved apically; M ratio 1.05–1.34. *Abdomen* (Fig. 9D): Syntergite 1+2 broadly pale basally; it and tergites 3–5 each with red-brown band that broadens laterally and extends to lateral margin; band on tergite 5 often interrupted medially. Tergites each with broad apical pale band. *Female terminalia:* Syntergosternite 7 length 3.95–4.99 mm, 1.27–1.64 times as long as mesonotum. Aculeus length 3.16–4.53; tip very finely serrate apically, length 0.13–0.14 mm, width 0.02 mm.

Distribution.—Venezuela.

Remarks.—This species is named for Katma P. Katiyar, Universidad de Zulia, who headed the survey in which most of the type series was reared.

Types.—Holotype: ♀ (IZAM) (USNM-48665), VENEZUELA: Zulia: Mara, 10°49′00″N 70°52′18″W, 60 m., ex. fruto del caimito *Sideroxylon obtusifolium* MFAKP-1062, 25.X.1995, K. Katiyar, J. Camacho, J. Oroño. Paratypes. VENEZUELA: Mérida: Sta. Rosa, trap #9, 28.VII.1983, 1♀ (USNM). Zulia: Same data as holotype, 1♂ (IZAM, USNM48666) 7♂7♀ (USNM48667–48680); Pringamosa, trap #7, 24.IV.1984, 3♂2♀ (USNM).

Anastrepha macrura Hendel
(Figs. 1A, C-D, 5G, 7H, 9E-F)

Anastrepha (Pseudodacus) macrura: Hendel 1914a: 66 [description in key], 1914b: 16 [description]; Lima 1934: 493 [Brazil].

Anastrepha macrura: Greene 1934: 143 [taxonomy]; Blanchard 1937: 41 [Argentina]; Lima 1937: 34 [host], 1938: 64 [illustration]; Stone 1942: 10; Bondar 1950: 13 [host]; Steyskal 1977b: 3 [key]; Zucchi 1978: 64 [Brazil]; Caraballo 1981: 151 [Venezuela, host]; Norrbom 1985: 117 [taxonomy]; Norrbom and Kim 1988: 1 [classification], 38 [host list]; White and Elson-Harris 1992: 142 [taxonomy, host list].

Pseudodacus macrurus: Stone 1939: 285 [taxonomy]; Aczél 1950: 237 [catalog]; Blanchard 1961: 294 [Argentina]; Foote 1967: 39 [catalog]; Silva et al. 1968: 585 [host list].

Pseudodacus macrura: Hardy 1968: 121 [type data].

Diagnosis.—This species differs from all other species of the *daciformis* group by the broad brown stripe on the facial carina (although other species sometimes have brown or gray subcuticular discolorations) and absence of the presutural lateral pale stripe from the scutum. The shape of the dorsal brown mark on the frons, usually triangular or semicircular and broadest medially, is also a useful character, although it is not fully developed in many of the specimens examined, which appear to be teneral.

Description.—Body predominantly red-brown to dark brown. *Head:* Mostly yellow. Frons with brown transverse dorsal band, usually somewhat semicircular or triangular and broadest in line with ocellar tubercle, orbital seta usually at margin of band. Facial carina with broad dark stripe on ventral 2/3–4/5. Gena with large brown spot below eye. Occiput with large triangular areas along lateral sutures of median occipital sclerite, sometimes with diffuse brown area ventrally. Posterior orbital seta absent. *Thorax* (Fig. 7H): Medial pale stripe strongly bilobed posteriorly, lobes moderately to extremely slender, usually extended to dorsocentral seta. Middle part of presutural lateral pale stripe absent, although lateral margin of scutum sometimes slightly paler than other dark areas; notopleuron with posterior third pale, including area around posterior notopleural seta. Presutural dorsocentral pale stripe connected to or narrowly separated from pale area on postpronotal lobe and pale sublateral stripe. Pleuron brown except following yellow areas: anterior and ventral margins of propleuron; anteroventral margin and posterodorsal third of anepisternum; two dorsal spots on katepisternum; katepimeron; anterior ¼ of meron; anterior ⅔ of katatergite; and most of anatergite. Subscutellum and mediotergite entirely dark brown. Scutum microtrichose except for medial presutural bare area on and between dorsocentral stripes, at most extended ⅔ distance to transverse suture; notopleuron microtrichose; scutellum entirely microtrichose except small basal area on side. *Wing* (Fig. 5G): C- and S-bands completely fused along costa to form broad, uninterrupted, orange to dark orange-brown marginal band; in cell br at most covering anterior half of section bordering cell bm, not extended to vein M; covering all of cells r_1 and r_{2+3} and anterior margin of cell r_{4+5}; well separated from apex of vein M. S-band incomplete, middle part between veins R_{4+5} and Cu_1 absent; basal part paler than C-band; extended over base of cell cu_1 and along vein Cu_1 at most halfway to dm-cu; not extended into cell dm. V-band pale and diffuse; extended anteriorly only slightly into cell r_{4+5}; distal arm absent. Vein M strongly curved apically; M ratio 1.41–2.04. Cell br 2/5 to 2/3 microtrichose, always with at least posterior half of section bordering cell bm bare. Cell bcu entirely microtrichose. *Abdomen* (Fig. 9E–F): Tergites, including base of syntergite 1+2 brown, except following white areas: extreme lateral margins of all tergites; small

transverse band on basal half of syntergite 1+2; and medial stripe, slightly to broadly expanded on apical half of syntergite 1+2, not connected to basal band. *Female terminalia:* Syntergosternite 7 length 4.99–6.66 mm, 1.43–1.89 times as long as mesonotum. Aculeus length 4.49–5.72 mm; tip nonserrate or with a few fine apical serrations, length 0.17–0.23 mm, width 0.035–0.04 mm.

Host plants.—Reported hosts include two species of Sapotaceae: *Chrysophyllum cainito* L. (Caraballo 1981); and *Pouteria lactescens* (Vell.) Kuhlmann (Lima 1937, 1938, Bondar 1950, as *Pradosia lactescens*).

Remarks.—This species was described as a new species twice by Hendel (1914a,b), and as neither description mentions the other, technically there are two available names, that of Hendel (1914b) being a primary homonym. The 1914a name was described from an unstated number of females from Paraguay, the 1914b name from an unstated number of females from "Paraguay, S. Bernhardino" in the MNM. A female in the MNM with the following labels is here designated as lectotype for both names: "Paraguay Fiebrig", "S. Bernardino", "A. macrura H. typus [Hendel's writing] det. Hendel", and orange bordered "typus". Hardy (1968) regarded a female in the NMW as "Type female" of *macrura* Hendel (1914b). It bears the following labels: "Paraguay, Fiebrig", "A. macrura H. det. Hendel [Hendel's writing]", orange "type" [not Hendel's writing], and "Pseudodacus macrura (Hendel) [Hardy's writing]". Although it could have been a syntype, and Hardy's statement therefore construed as a lectotype designation by inference of holotype, the facts that it does not have a San Bernardino label and that Hendel did not mention his own collection as a depository (as he usually did for other species where he retained material) are sufficient to regard it as a nontype.

The ratio of female terminalia length to mesonotum length is greater in the Bahia and Venezuela females and appears to increase in a northerly direction in this species.

Distribution.—Western Venezuela, Ecuador, Peru, Paraguay, Brazil (Bahia, Rio Grande do Norte). C.A. Korytkowski (pers. comm.) has examined specimens in the Universidad de Panama collection with the following data: PERU: Cajamarca: Poterillo, 18.II.1968, C.A. Korytkowski, 1♂; Cochabamba, 18.II.1968, D. Ojeda, 1♀.

Specimens examined.—Lectotype ♀ (MNM), PARAGUAY: San Bernardino, Fiebrig. Other specimens—BRAZIL: Bahia: Agua Preta, "ex. *Pradosia lactescens*", G. Bondar 2154, 4♂1♀ (USNM). Rio Grande do Norte: Natal, Jiqui, McPhail [trap], 6.III.1993, Malavasi & Maia, 1♂1♀ (FSCA). ECUADOR: Loja: Gonzanamá, Nambacola, 4°18'S 79°27'W, Quebrada grande, 1238 m, trampa Harris, VII.1992, S. Soto & H. Ruíz, 1♀ (CEEA). PARAGUAY: "D6579", 10.VI, Fiebrig, 1♀ (ZMHU); Fiebrig, 1♀ (NMW); San Bernardino, III.1908, Fiebrig, 2♀ (MNM, USNM). VENEZUELA: Aragua: Rancho Grande, 23.VII, 1♀ (USNM); Rancho Grande, 10.VII.1945, 1♂ (AMNH); Rancho Grande, 12.VII.1967, R.W. Poole, 1♂ (USNM); Rancho Grande, 1100 m, 31.VII.1967, J. Salcedo & A. Montagne, 1♀ (IZAM).

Anastrepha maculata Norrbom, new species

(Figs. 2C–E, 6B, 7I)

Diagnosis.—This species differs from other species of the *daciformis* group except *stonei* in having the distal arm of the V-band present. It differs from *stonei* as indicated in the key and in the diagnosis for *stonei*, and by the following characters: Scutum entirely microtrichose (nonmicrotrichose except lateral margin in *stonei*); posterior half of anatergite dark brown (white except posteroventral corner in *stonei*); and subscutellum and mediotergite entirely dark brown, or latter sometimes dark orange with 3 dark brown stripes (in *stonei*,

subscutellum orange, often with medial dark brown spot; mediotergite entirely orange). The female terminalia are relatively short compared to the other 3 Antillean species of the group (see Table 2).

Description.—Body predominantly yellow to orange. *Head:* Yellow except ocellar tubercle usually brown. Posterior orbital seta usually absent (weakly present on one side in 1♂). *Thorax* (Fig. 7I): Scutum usually with dark brown spot above postalar seta, sometimes with dark brown spot mesal to intra-alar seta and/or unpaired dark brown spot posterior to acrostichal setae. Medial pale stripe bilobed posteriorly, lobes stout, with distinct anterolateral corner, extended to dorsocentral seta. Presutural dorsocentral pale stripe connected anteriorly to pale area on postpronotal lobe and connected to or narrowly separated from pale sublateral stripe. Presutural lateral pale stripe poorly differentiated, appears to be complete, including posterior part of notopleuron. Scutellum with 3 dark brown spots, one medial and pair on margin between yellow basal and white apical areas. Pleuron with following dark brown spots: two dorsal spots on anepisternum; anterodorsal and posteromedial spots on katepisternum; medial spot on anepimeron; and posterior half of laterotergite. Subscutellum and mediotergite entirely dark brown, or latter sometimes dark orange with 3 dark brown stripes. Scutum and notopleuron entirely microtrichose; scutellum microtrichose basally, nonmicrotrichose on dark brown spots and apical white area. *Wing* (Fig. 6B): Bands yellow, orange and brown. C- and S-bands completely fused along costa, forming uninterrupted marginal band; cell R_1 without hyaline marginal area. C-band covering cell r_{2+3} to beyond level of r-m. S-band interrupted in medial cells and along vein Cu_1; basally with broad extension across vein Cu_2+A_1 almost to posterior wing margin; middle part not extended anteriorly beyond vein M, but often narrowly connected to V-band; subapically relatively broad, with large hyaline area in cell r_{2+3} but well separated from vein R_{2+3}; apically of medium breadth, extended to or almost to apex of vein M. V-band complete, not connected to S-band along vein R_{4+5}. Vein M strongly curved apically; M ratio 1.21–1.53. *Abdomen:* Tergites entirely yellow or orange, without dark brown marks. *Female terminalia:* Syntergosternite 7 length 2.58–2.85 mm, 1.03–1.15 times as long as mesonotum. Aculeus length 2.33 mm; tip with a few fine apical serrations, length 0.10 mm, width 0.025 mm.

Remarks.—The name of this species refers to the spots on its mesopleuron and scutellum.

Distribution.—Virgin Islands, Mona Island (between Puerto Rico and Hispaniola). This species presumably also occurs on Puerto Rico, which is between the Virgin Islands and Mona Island.

Types.—Holotype: ♀ (USNM), BRITISH VIRGIN ISLANDS: Guana Island, 0–80 m., 13–26.VII.1986, S.E. Miller & M.G. Pogue. Paratypes. BRITISH VIRGIN ISLANDS: Great Camanoe Isld., ⅓ mi. ESE Cam Bay, 20.III.1974, C.L. Remington, 1♂ (MCZ); Guana Island, 0–80 m., 13–26.VII.1986, S.E. Miller & M.G. Pogue, 1♂3♀ (USNM). PUERTO RICO: Mona Isld., Uvero, 19.X.1955, W.H. Cross, 1♂ (USNM).

Anastrepha murrayi Norrbom, new species

(Figs. 6C, 8A)

Diagnosis.—The extent of the dark brown area on the mesonotum, in combination with the mostly orange thoracic pleuron distinguishes this species from the other species of the *daciformis* group. Only it, *antilliensis*, and some *stonei* have the S-band complete. The female terminalia are relatively long compared to the other Antillean species of the group (see Table 2); in the other 3 species, the syntergosternite 7/ mesonotum length ratio is less than 1.35.

Description.—Body predominantly orange. *Head:* Yellow except ocellar tubercle brown. Posterior orbital seta absent. *Thorax*

(Fig. 8A): Mesonotum dark brown except pale stripes, postpronotal lobe, and anterior margin and medial half of anterior half of scutum. Medial pale stripe bilobed posteriorly, lobes moderately stout, with distinct anterolateral corner, not extended to dorsocentral seta. Presutural dorsocentral pale stripe connected anteriorly to pale area on postpronotal lobe and connected to pale sublateral stripe. Presutural lateral pale stripe incomplete, narrowly interupted at margin of scutum and postpronotal lobe, extended to level of presutural supra-alar seta, but absent from notopleuron. Scutellum dark brown except small white apical area. Pleuron mostly orange, without brown markings; dorsal margin of anepisternum and dorsal half of laterotergite white (other white markings, if present, not well differentiated in holotype). Subscutellum dark brown, mediotergite entirely orange. Scutum, notopleuron and scutellum nonmicrotrichose. *Wing* (Fig. 6C): Bands yellow orange and brown. C- and S-bands connected along vein R_{4+5}, but separated along costa (cells r_1, and r_{2+3} with marginal triangular hyaline mark). S-band complete, basally with broad extension across vein Cu_2+A_1 to posterior wing margin; subapically relatively narrow, hyaline area in cell r_{2+3} extended almost to vein R_{2+3}; apically moderately broad, extended to apex of vein M. V-band extended anteriorly to vein R_{4+5}, not connected to S-band; distal arm absent. Vein M moderately curved apically; M ratio 1.74. *Abdomen:* Tergites orange banded with posterior margins broadly white. Female terminalia: Syntergosternite 7 length 3.91 mm, 1.52 times as long as mesonotum. Aculeus length 3.24 mm; tip with apex broken, length at least 0.11 mm, width 0.03 mm. Spermathecae not studied.

Remarks.—This species is named for Roy Murray, who headed the survey in which the holotype was collected. The holotype was apparently pinned directly out of alcohol, as its head is shriveled, and its abdomen and genitalia were damaged by dissection prior to my examination of it, but most significant characters are observable.

Distribution.—Jamaica.

Holotype.—♀ (USNM), JAMAICA: Manchester, McPhail trap, 11.IV.1986, W. Greaves.

Anastrepha pallens Coquillett
(Figs. 1E, 6D, 8B–C)

Anastrepha pallens Coquillett 1904: 35 [description]; Hendel 1914a: 69 [key], 1914b: 14 [key]; Bezzi 1919a: 3, 1919b: 372 [list]; Dampf 1933: 262 [female terminalia]; Greene 1934: 154 [host, taxonomy]; Lima 1934: 511 [review]; Stone 1942: 10; Phillips 1946: 31, 106 [larva, host list]; Steyskal 1977b: 3 [key]; Norrbom 1985: 112 [taxonomy]; Norrbom and Kim 1988: 1 [classification], 51 [host list]; Steck et al. 1990: 343 [larval key]; Hernández-Ortiz 1992: 53 [Mexico]; White and Elson-Harris 1992: 163, 439 [host list]; Foote et al. 1993: 103 [USA].

Anastrepha (Pseudodacus) pallens: McPhail and Berry 1936: 405 [biology, host].

Pseudodacus pallens: Stone 1939: 283 [revision]; Baker et al. 1944: 115 [taxonomy, larva, biology]; Aczél 1950: 238 [catalog]; Wasbauer 1972: 17, 125 [hosts]; Foote 1965: 674 [catalog], 1967: 39 [catalog].

Anastrepha sp. 1: González and Tejada 1980: 126.

Diagnosis.—This species differs from other species of the *daciformis* group in having a hyaline basal marginal area in cell r_1 and the S-band interrupted along vein R_{4+5} and in cell dm along vein Cu_1 (Fig. 6D). The other species with a hyaline area in cell r_1 have the S-band complete. The brown posterior markings on the scutum (Fig. 8B–C) are also useful diagnosic characters.

Description.—Body predominantly orange to orange-brown. *Head:* Mostly yellow. Frons with brown transverse dorsal band, rectangular or often narrowed be-

tween ocellar tubercle and orbital plate, at most moderately broad, not extended anteriorly beyond orbital seta. Gena with brown spot below eye, sometimes faint, especially in teneral specimens. Occiput yellow. Posterior orbital seta absent (of 39 specimens examined with intact head setae, present only on 1♂ (BMNH)). *Thorax* (Figs. 8B–C): Scutum posteriorly with 2–3 brown spots or usually with trilobed brown band. Medial pale stripe bilobed posteriorly, lobes relatively stout, usually with distinct anterolateral corner, not extended to dorsocentral seta. Presutural dorsocentral pale stripe connected anteriorly to pale area on postpronotal lobe and connected, or rarely narrowly separated from, pale sublateral stripe. Presutural lateral pale stripe well differentiated, complete, including posterior part of notopleuron. Scutellum with lateral brown spot or complete transverse brown band bordering apical white area. Pleuron without brown markings; orange except following white areas, often not well differentiated: all of propleuron; anteroventral corner and posterodorsal half of anepisternum; dorsal band or 2 spots on katepisternum; katepimeron; anterior ¼ of meron; anterior ⅔ of katatergite; and most of anatergite. Subscutellum and mediotergite entirely orange. Scutum nonmicrotrichose except lateral margin lateral to postsutural supra-alar seta; notopleuron partly microtrichose; scutellum microtrichose except extreme base of disc and most of side. *Wing* (Fig. 6D): Bands yellow to orange and pale brown. C- and S-bands entirely separated or connected in cell R_1 along vein R_{2+3} (but not along vein R_{4+5}; most of cell r_{2+3} hyaline basal to r-m); cell r_1 with marginal hyaline mark, although sometimes small. S-band interrupted along vein R_{4+5} and in cell dm along vein Cu_1; middle part extended anteriorly to vein R_{4+5} along r-m; subapically narrow, hyaline area in cell r_{2+3} extended to vein R_{2+3}; apically relatively narrow, but usually extended to apex of vein M. V-band extended anteriorly to vein R_{4+5}, connected to or occasionally narrowly separated from apical part of S-band; distal arm absent. Vein M strongly curved apically; M ratio 1.27–1.95. *Abdomen:* Tergites each with complete broad orange or partially red-brown band that broadens laterally (pattern similar to Fig. 9A, but not as dark). *Female terminalia:* Syntergosternite 7 length 2.91–3.70, 0.95–1.17 times as long as mesonotum. Aculeus length 2.66–3.05 mm; tip finely serrate apically, length 0.12–0.14 mm, width 0.02–0.04 mm.

Host plants.—This species has been reported from fruits of two species of *Sideroxylon* (Sapotaceae): *S. celastrinum* (Kunth) T.D. Pennington (Greene 1934, Phillips 1946, as *Bumelia angustifolia*), commonly known as coma (Cronquist 1945); and *S. lanuginosa* Michx. (Wasbauer 1972, as *Bumelia lanuginosa*; confirmed by examined specimen). McPhail and Berry (1936) and Baker et al. (1944) also reported *Bumelia spiniflora* A.DC., with the common name "la coma", as a host. I have been unable to trace this name in the botanical literature (Cronquist 1945, Anonymous 1982) and it probably is a misspelling of *spinosa* A.DC., a synonym of *celastrinum*. Both McPhail and Berry (1936) and Baker et al. (1944) reported that the larvae feed inside the single large seed within the fruit.

Remarks.—Coquillett (1904: 31) said the type depository would be the Brooklyn Institute of Arts and Sciences, but it was either never returned or was transferred back to the USNM when much of the Brooklyn collection was sent here.

Distribution.—USA (southern Texas) to Honduras and El Salvador. In Mexico, also reported from Coahuila, Guerrero, and Nayarit (Hernández-Ortíz 1992).

Specimens examined.—Holotype ♂ (USNM, No. 1353), USA: Texas: Brownsville, VI.[1903, C. Schaeffer]. Other specimens—EL SALVADOR: Central, T-9, 29.VII.1992, SS-2, 1♀ (López). GUATEMALA: Baja Verapaz: Salamá, Asgrow, 16.VIII.1992, 1♂ (López); same, 3.IX.1992, 1♀ (USNM). Escuintla: Palín, Granja Sta.

Maria Xalapan, 25.VI.1992, J. López, 1♀ (USNM); Finca Maria Santisima, 29.V.1992, J. López, 1♀ (López). HONDURAS: Tegucigalpa, 29.II.1918, F.J. Dyer, 1♂ (AMNH); Tegucigalpa, F.J. Dyer, 1♀ (USNM); Tegucigalpa, 3.V.1957, A.S. Banegas, 1♂1♀ (USNM). MEXICO: Chiapas: Mazapa de Madero, 23.V.1986, 1♂ (USNM); Tapachula, 27.IV.1984, E. Rios, 1♀ (USNM). Jalisco: Tomatlán, 11.IV.1990, S. Robles, 1♀ (IEXV). Nuevo Leon: Allende, II.1986, E. Pinson, 1♀ (IEXV); nr. Allende, Quebradora, 9.I.1997, D. Thomas, 1♀ (USNM). Oaxaca: Chahuites, IV.1984, J. Garcia, 1♂ (USNM). Sinaloa: Los Mochis, 15.III.1954, C.O. Peterson, 1♀ (USNM); Los Mochis, 12.IV.1954, C.O. Peterson, 1♂ (USNM); Los Mochis, 26.IV.1954, 1♂1♀ (USNM). Sonora: Guaymas, IV.1927, Aranjuel, 1♀ (USNM). Tamaulipas: Reynosa, 15.VIII.1988, B. Chávez, 1♀ (IEXV); 61.6 S Reynosa, Ebony, 19.II.1936, H.S. Hensley, 2♀ (USNM); 62.8 S Reynosa, Mesquite, 27.XI.1935, H.S. Hensley, 1♀ (USNM); Santa Engracia, C.C. Plummer, 4♂6♀ (USNM); Santa Engracia, McPhail trap in yellow chapote, 11.IX.1987, J.L. Leyva, 1♀ (TAMU). Veracruz: Apazapan, 29.V.1991, G. Quintero & L. Quiroz, 1♂1♀ (IEXV). U.S.A.: Texas: Brooks Co.: Falfurrias, 30.III.1935, L.R.D., 1♀ (USNM). Cameron Co., XII.1934, N.O. Berry, 7♂10♀ (USNM); San Benito, 28.III.1932, G.M. Douglas, 1♂1♀ (USNM); Victoria, "bred *Bumelia languin.* berry", 22.VIII.1907, J.D. Mitchell, 1♂ (USNM). Hidalgo Co.: Donna, "reared from J.W. Monk", 16.V.1932, C.T. Greene, 3♂1♀ (USNM); Donna, 21.VI.1932, J.W. Monk, 2♂2♀ (BMNH); Edinburg, 12.I.1937, D.H.A., 3♂ (USNM); 1 mi. S Mission, C.J. Volz, 1♂ (USNM); Pharr, 12.II.1934, N.P. Patton, 1♀ (USNM); Pharr, 7.I.1935, W.P.P., 1♂ (USNM); Weslaco, 10.II.1932, G.V.H., 1♂ (USNM); Weslaco, 9.III.1932, G.M. Douglas, 1♂ (USNM). Starr Co.: Rio Grande City, 30.V.1935, R.V. Ray, 1♀ (USNM). Webb Co.: Laredo, McPhail trap, 8.VII.1988, 2♂1♀ (USNM).

Anastrepha stonei Steyskal
(Figs. 1F, 6E, 8D–E, 9G–H)

Anastrepha stonei Steyskal 1977a: 79 [description], 1977b: 3 [key]; Norrbom 1985: 110 [taxonomy]; Norrbom and Kim 1988: 1 [classification].

Diagnosis.—This species differs from all other species of the *daciformis* group in having the dorsocentral pale stripe extended posteriorly from the transverse suture to beyond the dorsocentral seta; the scutum with numerous discrete dark brown spots or stripes; and the wing with 3–4 dark brown marginal spots and another on r-m.

Description.—Body predominantly yellow to orange. *Head:* Mostly yellow. Frons with ocellar tubercle and elongate triangular spots along eye margin brown, these spots not connected. Gena with large brown spot below eye. Posterior orbital seta absent. *Thorax* (Figs. 8D–E): Scutum with following dark brown areas: spot posterior to middle of postpronotal lobe; stripe, sometimes interrupted, between sublateral pale stripe and postsutural supra-alar and postalar setae; usually spot mesal to intra-alar seta; and usually an unpaired spot between acrostichal setae. Medial pale stripe expanded posteriorly and connected to dorsocentral stripe or narrow and isolated. Presutural dorsocentral pale stripe connected anteriorly to pale area on postpronotal lobe, connected to pale sublateral stripe at transverse suture, and extended posteriorly to dorsocentral seta. Presutural lateral pale stripe well differentiated, complete, including posterior part of notopleuron. Scutellum with pair of dark brown lateral spots or short bands between yellow basal and white apical areas, sometimes almost connected medially. Pleuron with following dark brown areas: two dorsal spots and usually one posteroventral spot on anepisternum; anterodorsal and posteromedial spots on katepisternum; medial spot on anepimeron; posterior half of katatergite and extreme posteroventral corner of anatergite; and spot on metapleuron. Subscutellum orange, of-

ten with medial dark brown spot; mediotergite entirely orange. Scutum nonmicrotrichose except lateral margin lateral to postsutural supra-alar seta; notopleuron and scutellum entirely nonmicrotrichose. *Wing* (Fig. 6E): Bands yellow, orange and brown; also with small discrete brown spots, usually 4 along costal margin and 1 at anterior end of r-m. C- and S-bands completely fused along costa, forming uninterrupted marginal band; cell R_1 without hyaline marginal area. C-band not covering most of cell r_{2+3} basal to level of r-m. S-band complete (Dominican Republic ♀) or interrupted in cell r_{2+3} and along vein Cu_1; basally with broad extension across vein Cu_2+A_1 to or almost to posterior wing margin; middle part extended anteriorly to vein R_{4+5} along r-m; subapically moderately broad, hyaline area in cell r_{2+3} extended almost to vein R_{2+3}; apically narrow or of medium breadth, extended to or usually well separated from apex of vein M. V-band complete, not connected to S-band along vein R_{4+5}. Vein M strongly curved apically; M ratio 1.27–1.40. *Abdomen* (Figs. 9G–H): Tergites white to yellow, with medial dark brown bands or rows of spots. *Female terminalia:* Syntergosternite 7 length 2.79–3.24 mm, 1.16–1.31 times as long as mesonotum. Aculeus length 2.56–2.77 mm; tip with a few fine apical serrations, length 0.12–0.15 mm, width 0.025–0.03 mm.

Remarks.—The single female from the Dominican Republic differs from typical specimens of *stonei* in having a complete S-band. Most of its terminalia were lost by prior dissection. The female from Florida may have been a stray from the Bahamas, as no additional specimens have been collected, despite continuous fruit fly trapping surveys in the state.

Distribution.—Bahamas, Hispaniola, and possibly southern Florida.

Specimens examined.—Holotype ♂ (USNM), BAHAMAS: New Providence, Nassau, IX.1976, C. Smith. Other specimens—BAHAMAS: 6.IX.1977, 1♂3♀ (USNM, FSCA). Abaco, Bahama Star Grove, 28.X.1993, D. Tollett, 1♀ (USNM); Bahama Star Grove, XII.1994, 1♂ (FSCA). Grand Bahama, Freeport, Parker Groves, McPhail trap in guava tree, 9.VI.1986, 1♀ (USNM); Freeport, Holmes Rock, McPhail trap in *Manilkara zapota*, 28.VIII.1986, 1♂ (USNM). New Providence: 3.VI.1977, C.W. Smith, 1♀ (USNM); 4.VI.1977, J. Gilbert, 2♂ (USNM); Fox Hill Creek, 20.V.1977, J. Gilbert, 1♂ (USNM); Nassau, McPhail trap in guava tree, 1.X.1976, J. Gilbert, 1♂ (USNM); Nassau, IX.1976, C. Smith, 1♂ paratype (USNM); Nassau, Ocean Paradise I. Resort, McPhail trap, 15.VIII.1997, 1♂ (USNM). DOMINICAN REPUBLIC: Santo Domingo Int'l. Airport, McPhail trap, 14.III.1991, D. Jimenez, 1♀ (USNM). USA: Florida: Palm Beach Co., Manalapan, Jackson trap in seagrape, 8.VIII.1988, D.M. Leone, 1♀ (USNM).

Anastrepha zucchii Norrbom, new species

(Figs. 5H, 8F, 9I)

Diagnosis.—This species differs from other species of the *macrura* complex (*aquila, avispa, bicolor* and *macrura*) as follows: Notopleuron entirely dark, and presutural lateral pale stripe reduced to a spot anterolateral to presutural supra-alar seta that is isolated from pale area on postpronotal lobe; presutural dorsocentral pale stripe absent; wing with broad, moderate brown stripe from cell bcu to apex of cell cu_1, not extended into cell dm; V-band completely absent, crossvein dm-cu without faint brown border; and dorsal brown mark on frons usually bilobed and narrowest medially. It further differs from *macrura* as follows: pale medial stripe on abdomen not expanded on apical half of syntergite 1+2, sometimes connected to transverse band on base of syntergite 1+2; tergites without narrow white lateral margins; occiput dark except anterior margin; and facial carina entirely yellow.

Description.—Body predominantly dark brown. *Head:* Yellow and brown. Frons with brown transverse dorsal band, usually

bilobed anteriorly and narrowest in line with ocellar tubercle, orbital seta within band. Gena with large brown spot below eye. Occiput brown except anterior margin and narrowly dorsomedially. Posterior orbital seta absent. *Thorax* (Fig. 8F): Postpronotal lobe with anteromedial 1/5–2/5 brown. Medial pale stripe strongly bilobed posteriorly, lobes extremely slender, relatively short, not extended to dorsocentral seta. Presutural dorsocentral pale stripe absent. Presutural lateral pale stripe incomplete, on scutum reduced to spot isolated from postpronotal lobe, and absent from notopleuron. Pleuron brown except following yellow areas: narrow anteroventral area and posterodorsal third of anepisternum; two dorsal spots on katepisternum; katepimeron; anterior ⅔ of katatergite; and most of anatergite. Subscutellum and mediotergite entirely dark brown. Scutum without microtrichia medially, microtrichose only lateral to sublateral stripe and posterior to acrostichal seta; notopleuron microtrichose; scutellum microtrichose except basal area on side. *Wing* (Fig. 5H): C- and S-bands completely fused along costa to form broad, uninterrupted, moderate to dark brown marginal band; in cell br extended to vein M along cell bm; covering all of cells r_1 and r_{2+3} and anterior margin of cell r_{4+5}; well separated from apex of vein M. S-band incomplete, middle part between veins R_{4+5} and Cu_1 absent; basal part almost as dark as C-band; extended over base of cell cu_1 and broadly and distinctly along posterior side of vein Cu_1 to its apex; not extended into cell dm. V-band completely absent. Vein M strongly curved apically; M ratio 1.52–1.79. Cell r_1 microtrichose bordering cell bm, with large bare area in apical half. Cell bcu entirely microtrichose. *Abdomen* (Fig. 9I): Tergites, including base of syntergite 1+2 and lateral margins of all tergites, entirely dark brown except for narrow transverse white band near middle of syntergite 1+2 and narrow medial white stripe from syntergite 1+2 to tergite 5, these two marks sometimes connected to form a T-shaped mark. *Female terminalia:* Syntergosternite 7 length 4.62–5.28 mm, 1.46–1.57 times as long as mesonotum. Aculeus length 4.78 mm; tip finely serrate apically, length 0.10 mm, width 0.05 mm.

Remarks.—This species is named for Roberto A. Zucchi, in recognition of his contributions to *Anastrepha* systematics.

Distribution.—Brazil (Roraima).

Types.—Holotype: ♂ (INPA) BRAZIL: Roraima: Rio Uraricoera, Ilha de Maracá, armadilha de Malaise, 2–13.V.1987, J.A. Rafael, J.E.B. Brasil & L.S. Aquino. Paratypes. Same data as holotype, 4♂ (INPA) 2♂1♀ (USNM).

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